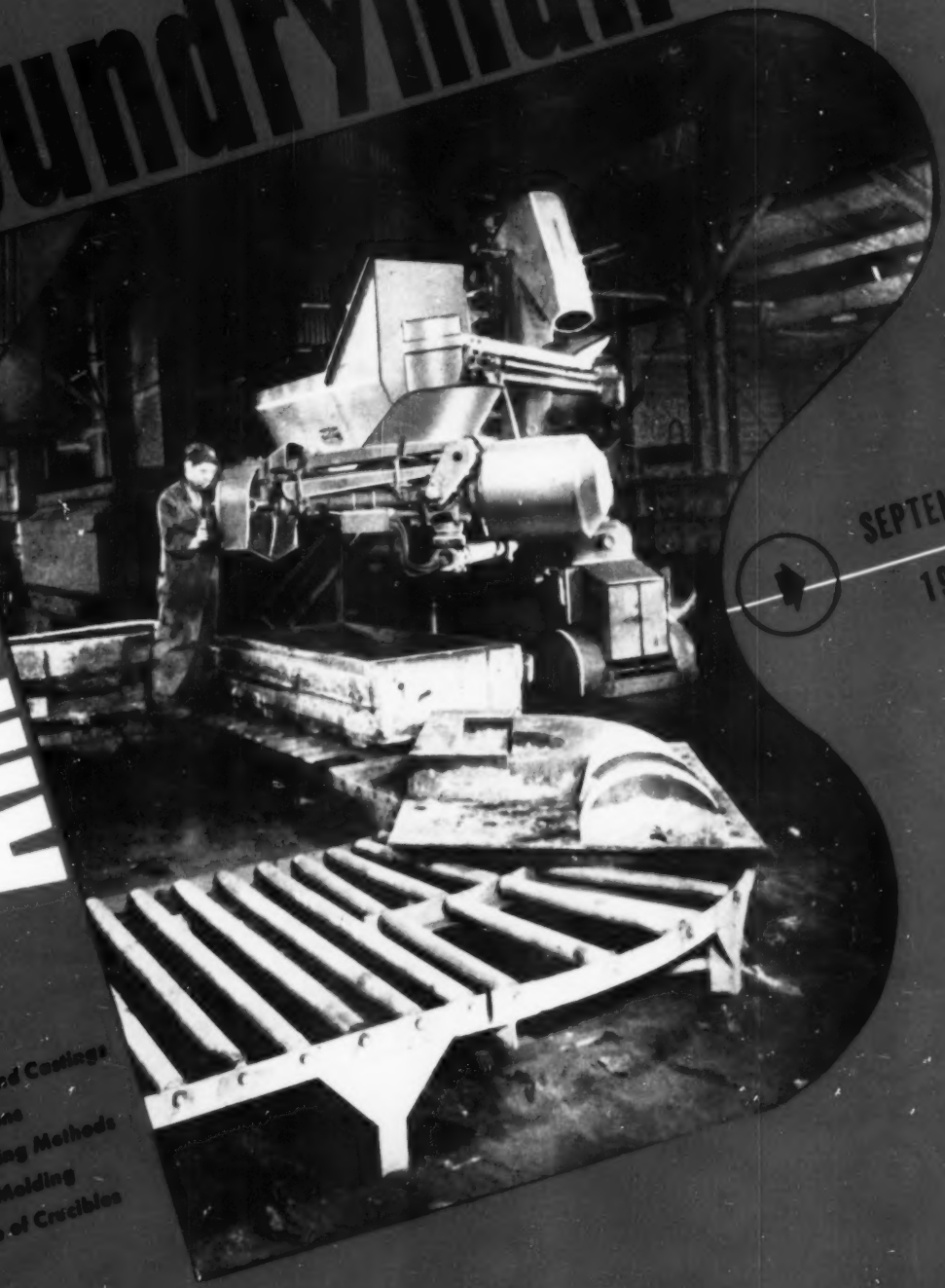
The Foundrymen's Own Magazine

American Foundryman



SEPTEMBER 1953

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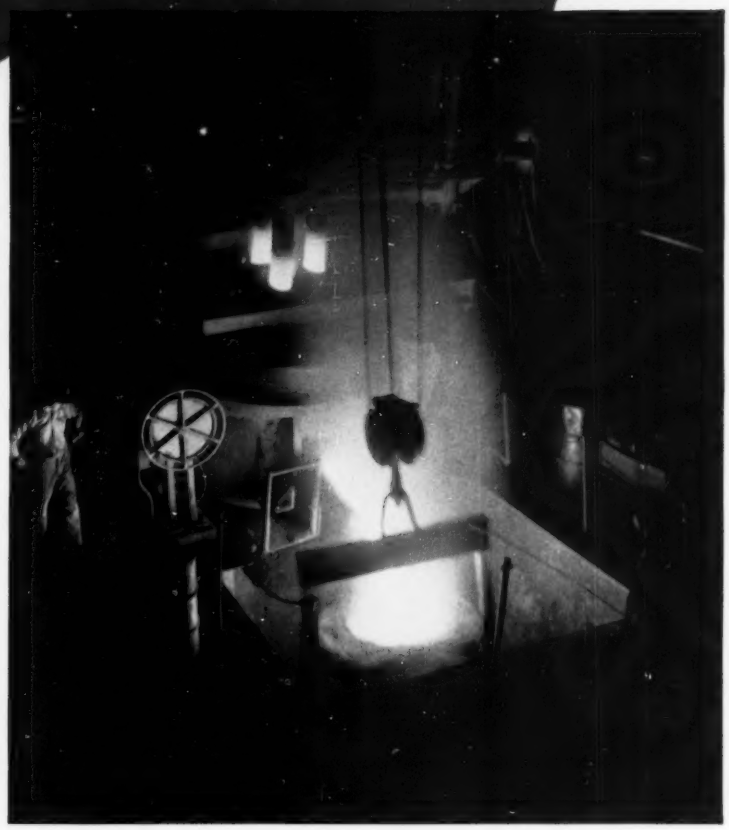
Highest quality HESCO steels pass 100% radiographic inspection!



*Lectromelt** **Furnace's pin-point control helps make it possible with savings in labor, power and downtime . . .**

"We have to be able to turn on a dime. We need that kind of versatility and our Lectromelt Furnace gives it to us," says Hartford Electric Steel Corporation, Hartford, Conn. And, government specifications for guided missiles require HESCO steel to pass 100% radiographic inspection.

Their CQT Lectromelt Furnace permits exact temperature control and precise analysis control . . . lets them duplicate melt after melt, or shift into high gear fast when the next heat must be a different alloy.

HESCO top-charges their new Lectromelt in 5 minutes as against a former 25 minutes for door-charging their old furnace. This cuts downtime and saves many man-hours of labor daily. It saves power because the furnace stays hot and ready to go on a new heat.

Write for Bulletin #9, telling you what Lectromelt Furnaces will do to help you keep ahead in the field. Pittsburgh Lectromelt Furnace Corporation, 316 32nd Street, Pittsburgh 30, Pennsylvania.

Manufactured in . . . CANADA: Lectromelt Furnaces of Canada, Ltd., Toronto 2 . . . ENGLAND: Birlec, Ltd., Birmingham . . . FRANCE: Stein et Roubaix, Paris . . . BELGIUM: S. A. Belge Stein et Roubaix, Bressoux-Liege . . . SPAIN: General Electrica Espanola, Bilbao . . . ITALY: Forni Stein, Genoa. JAPAN: Daido Steel Co., Ltd., Nagoya

*REG. T. M. U. S. PAT. OFF.

MOORE RAPID

WHEN YOU MELT...

Lectromelt

EASY SAND CONTROL

We don't say it's as easy as A-B-C, but we do insist the seacoal-bentonite-stabilizer method will *simplify* sand control for you. And give you uniform, thoroughly satisfactory results!

By adding the above-mentioned materials to your sand in varying amounts, sand characteristics can be closely controlled and changed at will—to satisfy specific requirements. Carbon content is controlled by adding CROWN HILL SEACOAL. Green and dry strengths are varied by the addition of FEDERAL GREEN BOND BENTONITE. Greater flowability and better shakeout are obtained by adding FEDERAL SAND STABILIZER.

Common lake, river or beach sand can be used for replacement, without danger of grain size going out of balance—as will happen when offals of cores, made of coarse sand, mix with fines which must be used with emulsified asphalt or resin additives. And, (you'll like this!) *the cost of these three additives will not exceed $1.00 per ton of castings produced!*

So, for easy, efficient, economical sand control—change to the method of sand preparation already preferred by an overwhelming majority of iron foundries. We have a new bulletin with full details —write for your copy—TODAY!

CROWN HILL SEACOAL

Produced by Federal at Crown Hill, West Virginia. High in volatile combustible material, low in sulphur and ash content—basic requirements for a top quality seacoal. Ground or granulated to properly match the sand used.

FEDERAL GREEN BOND

Mined, processed and guaranteed by Federal. Unexcelled in uniformity and ability to develop green and dry strength. Possesses many times the natural bonding power of any other sand bond. Truly the best of the bentonites!

FEDERAL SAND STABILIZER

A processed cellulose sand additive whose high combustibility allows sand to expand evenly to eliminate casting defects. It increases sand flowability to provide better ramming conditions and attracts moisture to broaden the safe moisture range.
IMPORTANT . . . Federal Sand Stabilizer also holds lumpy shakeout to an absolute minimum!

FEDERAL

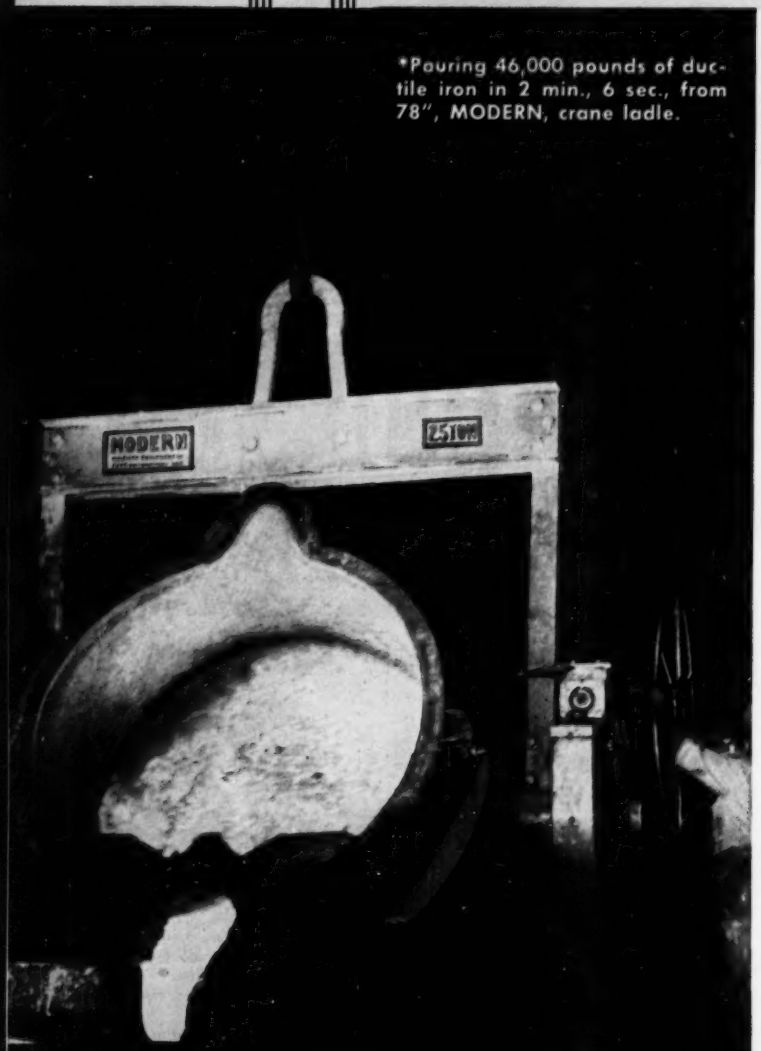
The FEDERAL FOUNDRY SUPPLY Company

4600 EAST 71st STREET CLEVELAND 5, OHIO

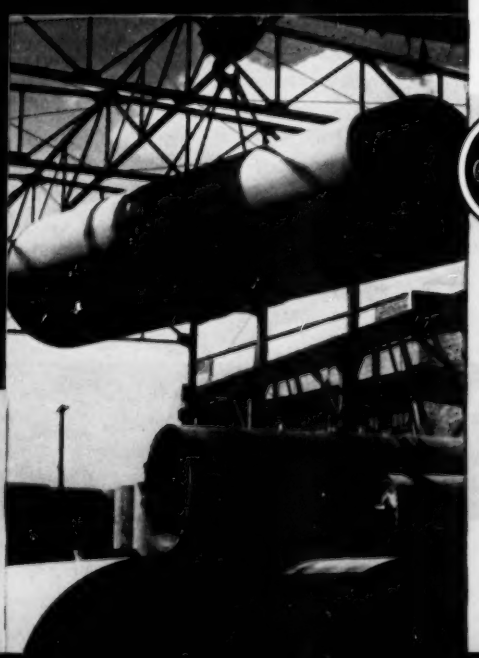
CROWN HILL, W. VA. • CHICAGO • DETROIT • MILWAUKEE • RICHMOND, VA. • ST. LOUIS • CHATTANOOGA • NEW YORK • UPTON, WYO.

LADLES ENGINEERED TO THE JOB

Pay off in three Big ways...



*Pouring 46,000 pounds of ductile iron in 2 min., 6 sec., from 78", MODERN, crane ladle.



...e cast dryer rolls for high pro-...uction paper making machines ...e ready for machining after cast-...g at the Beloit Iron Works foundry.

1 *UNIFORMITY OF METAL CAST . . .
2 MORE PAY-TIME OVER THE MOLD . . .
3 REDUCED WASTE, LESS PIGGING . . .

Working closely with practical foundrymen, right out on the job for more than thirty years, has qualified MODERN engineers for designing the difficult, made-to-measure jobs.

*Today it may be receiving the iron direct from cupola at a spout height of 66" and pouring the 46,000 pounds into one mold from one ladle load as shown here. This huge casting was poured in 2 min., 6 seconds. The ladle of 78" top diameter and 65" deep is balanced for use with lining of 3½".

Tomorrow the requirement may be thin-wall brass and the necessary, split-second timing as required for a one-man, non-ferrous, pouring operation from a crucible.

Always regardless of the complexities MODERN ladles are designed to serve in their one-best-way. We'd like to plan with you, too. The savings you make on your engineered-to-the job ladles can be applied to your purchases of POURING DEVICES . . . MONORAIL SYSTEMS and FOUNDRY CRANES!

If your entire problem cannot be stated on the coupon put it on your letterhead, addressed to —

MODERN

MODERN EQUIPMENT COMPANY
Dept. A-9, Port Washington, Wisconsin

MAIL TO MY ATTENTION:

Standard ladle catalog, 149 ☐
Metal pouring systems, 147 ☐
Catalog on cupolas and charging methods, 147-A ☐
Crane and monorail systems, 150 ☐
More information on FREE use of MODERN, sound, color, 16mm films ☐

Company .....
Street .....
City ..... State .....
Att'n: .....

MODERN representatives in all parts of the world.

American Foundryman

Volume 24 **September 1953** *Number 3*

Published by American Foundrymen's Society

Commonly used for large molds, the motive slinger is being used here to ram medium-sized work on a roller conveyor. Set-up and finishing are done in an adjacent bay. Full story on slinger application starts on page 39.

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We could talk until we're blue in the face, but—

NOTHING CAN SELL OUR FLUX LIKE THE FLUX *itself*

For more than 34 years, our interest has been in casting improvement—reduced casting rejects—by enabling foundries to pour clean, more fluid iron. We are enthusiastic over our achievement, but must admit that results speak more convincingly than thousands of words when you try—

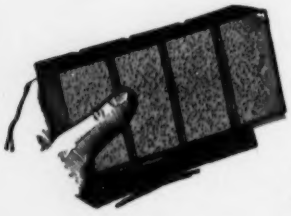
Famous CORNELL CUPOLA FLUX

The Time Proven Metal Cleanser

Summary of results leading gray iron foundries, and malleable foundries with cupolas, report from the use of Famous Cornell Cupola Flux:

- **CLEAN IRON.**
- **MORE FLUID IRON.**
- **REDUCED SULPHUR.**
- **FLUID SLAG.**
- **SOUNDER CASTINGS.**
- **IMPROVED MACHINABILITY.**
- **CLEANER CUPOLAS.**

SCORED BRICK FORM

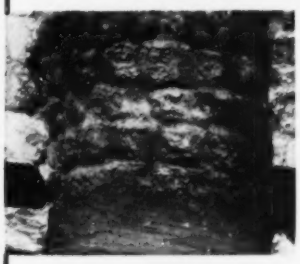


Approx. 4 pound brick

THE EASIEST FORM OF FLUX TO USE. It takes but a few seconds and practically no labor to flux your iron—there's no digging out of container, no weighing, no measuring. Just lift Famous Cornell Cupola Flux from container and toss it into cupola with each ton charge of iron, or break off one to three briquettes (quarter sections) for smaller charges, as per instructions.

WRITE FOR BULLETIN NO. 46-B

THE CUPOLA before using Famous Cornell Cupola Flux.



THE CUPOLA during use of Famous Cornell Cupola Flux.

KEEPS CUPOLAS CLEANER. Reduces Down Time and Maintenance Cost.

Famous Cornell Cupola Flux does double duty because it also makes drops cleaner, practically eliminates bridging over, and reduces erosion of cupola lining due to the glazed or vitrified surface which it forms on brick or stone.

The Cleveland Flux Co.

1026-1040 MAIN AVENUE, N. W., CLEVELAND 13, OHIO

Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes – Since 1918

FAMOUS FLUXKEG

Trade Mark Registered

BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

Here's How...

• • • Formed Plastics Co., Toledo, Ohio, makes plastic core dryers on a Stokes 200-ton semi-automatic compression molding press. Plastic is used to replace aluminum in this dryer, which is said to cut material costs up to two-thirds, and to reduce core-baking time greatly. These plastic core dryers were designed to enable foundrymen to take advantage of dielectric heating to bake cores for precision castings. They are molded of thermo-setting Plaskon alkyd compound set with glass fiber.

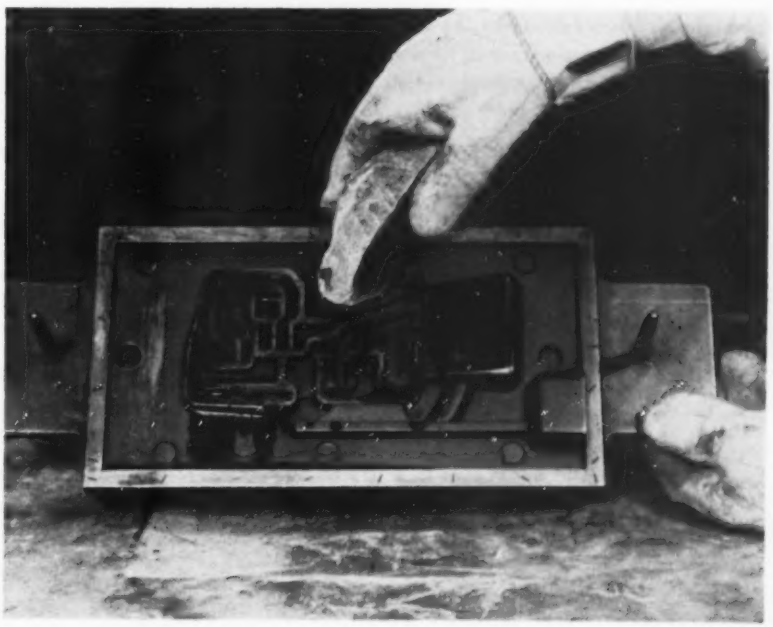
For more data, circle No. 1 on card, page 17

• • • The Bullard Co., Bridgeport, Conn., uses Marblette No. 71, a phenolic casting resin, for reproducing intricate machine tool parts in plaster molds. The product is a low viscosity, high stability resin which needs no special equipment in foundry pattern use. Manufacturer says resin is quite durable and will withstand rough foundry treatment remarkably well, and that cast plastic patterns made with it are ideally suited for match-plate mounting and tool working.

For more data, circle No. 2 on card, page 17

• • • Carbocera 1191, a mold lubricant, is being used by foundries in the shell molding process. This wax product is proving satisfactory in the handling of hot patterns. Cornelius Products Co., the manufacturer, is experimenting on the use of the product in an emulsion form.

For more data, circle No. 3, p. 17



for assured high efficiency

in making a casting use...

PENOLYN CORE OIL

For maximum foundry efficiency—be sure to specify Penolyn Core Oil. There is a grade of Penolyn for every type of casting, to meet the most exacting requirements of every conceivable Foundry and Core Room Practice.

Penolyn Core Oil offers these 10 Important Features for full efficiency

- Uniformity
- Concentrated form
- No obnoxious odor
- No seepage
- No crusting or green mix
- Clean working
- Wide temperature range
- Polymerized formulation
- Minimum gas
- Ample collapsibility

For expert technical assistance—be sure to call the nearest Penola Office for any technical data or assistance you may need regarding your casting operations.

Penola

PENOLA OIL COMPANY • NEW YORK • DETROIT • CHICAGO

VOLCLAY BENTONITE

NEWS LETTER No. 33

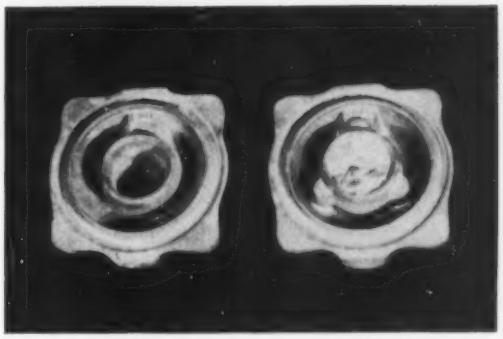
REPORTING NEWS AND DEVELOPMENTS IN THE FOUNDRY USE OF BENTONITE

Poor Lifts..?

How many defective castings have you seen as illustrated in Fig. 1?

These castings were made in clusters of four to the gate and it was quite common to lose one, two, or even all if the molding sand lost its standard properties.

Assuming the pattern, taper, parting, etc. have been worked-out properly and the castings were in production, **what may cause such defects to appear?**



GOOD REJECT

Fig. 1

Usually the principal molding sand reasons are:

(1) Loss of deformation. — (2) Loss of tensile strength. — (3) Increased mold hardness in that given area.

For deep lifts, pockets, narrow green sand cross-sections, it is important to maintain standard green sand properties.

If the bond addition or content drops, the deformation and tensile strengths drop rapidly. Tensile strength is that property which holds sand bonded grains together when an attempt is made to pull the mass apart.

As the moisture content decreases, so does the deformation, thus the molding sand becomes brittle, friable and may easily give poor draws and crumbly edges.

Usually as the cellulose and seacoal materials increase, the molding sand becomes brittle with sharp loss in tensile strength.

A soldier, gagger, pin, nail, bar, etc. may aid this condition, but why add more expense to the molding costs?

We recommend:

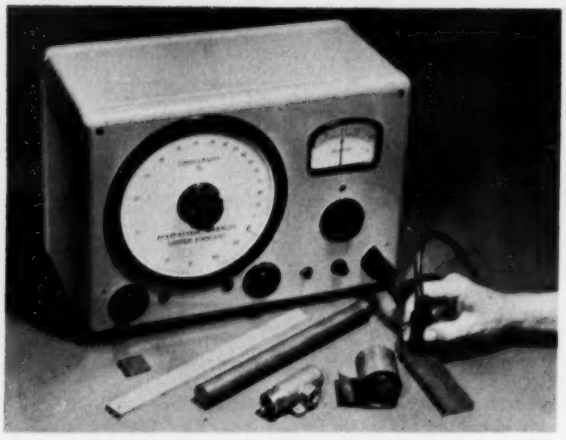
(1) Add enough Volclay western bentonite to return the green compression strength, the deformation and the tensile strength.
(2) Increase moisture slowly, as the bentonite is increased.
(3) Avoid ramming *hard* in the pockets. Tuck lightly, but don't over ram, jolt or butt.
(4) Reduce the cellulose materials gradually.
(5) To hasten results, approximately ½% by weight cereal or corn flour may be added to the mixture, but must be controlled closely in order to avoid other defects.

AMERICAN COLLOID COMPANY
CHICAGO 54, ILLINOIS
Producers of Volclay and Panther Creek Bentonite

Products & Processes

For additional information,
use postcard at bottom of page 17

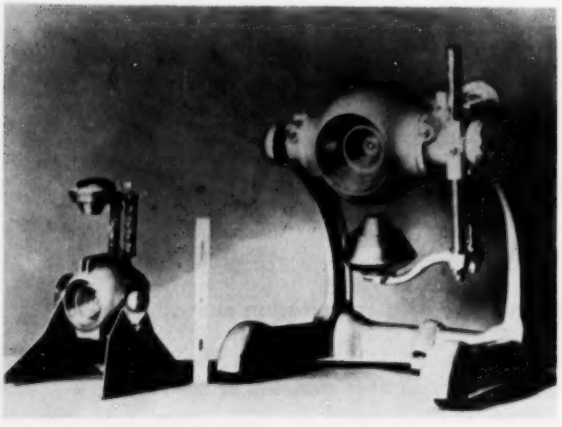
(continued on page 10)



Indestructive Conductivity Test

This FM-100 conductivity meter combines non-destructive testing and electronics to provide industry a practical and useful measuring tool. Instrument gives absolute conductivity readings of non-ferrous conducting materials directly from large dial on front of unit. Magnatest is portable, operates from any 110-220 volt ac power source. *Magnaflux Corp.*

For more data, circle No. 4, page 17



Gamma-Rays Machine

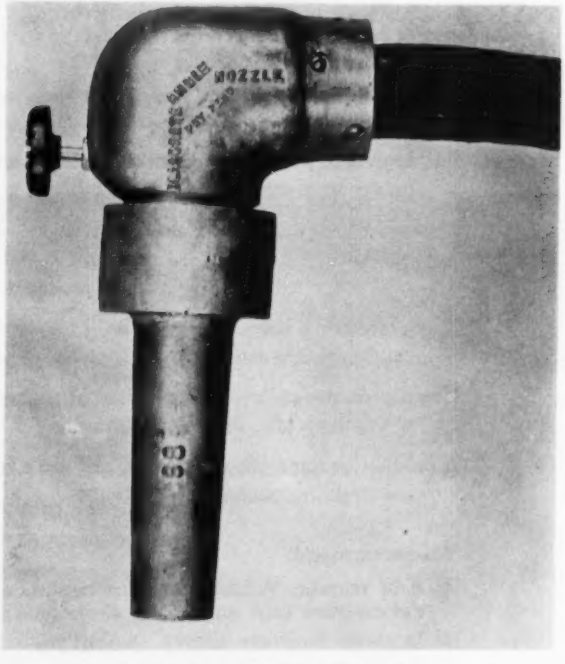
Industrial radiography is said to attain its highest efficiency, economy, safety, and convenience of application in this equipment. Unit is used in detecting structural defects in castings, forgings, plates, weldments, and other dense, opaque materials. Machine has no wires, switches, valves, tubes, or working parts. Weighs 47 lb, stands 11-in. high, has capacity of 300 mc of cobalt-60. *Gamma Inds., Inc.*

For more data, circle No. 6, page 17

Fast, Flexible Power Sweeper

Here is a newly developed power sweeper that reportedly will sweep over 100,000 sq ft per hour in open areas, and can be dumped by one man in about 30 seconds. Manufacturer says sweeper can do the work of a 3 to 12-man push-broom crew, although operated by only one man. Covers 36-in. wide path; picks up dirt, litter, and dust at speeds up to 6 mph. A rotary, 21-in. side-brush increases path width to 48 inches, allows cleaning flush with walls, curbs, fences. *G. H. Tennant Co.*

For more data, circle No. 5, page 17



New Refractory Nozzle

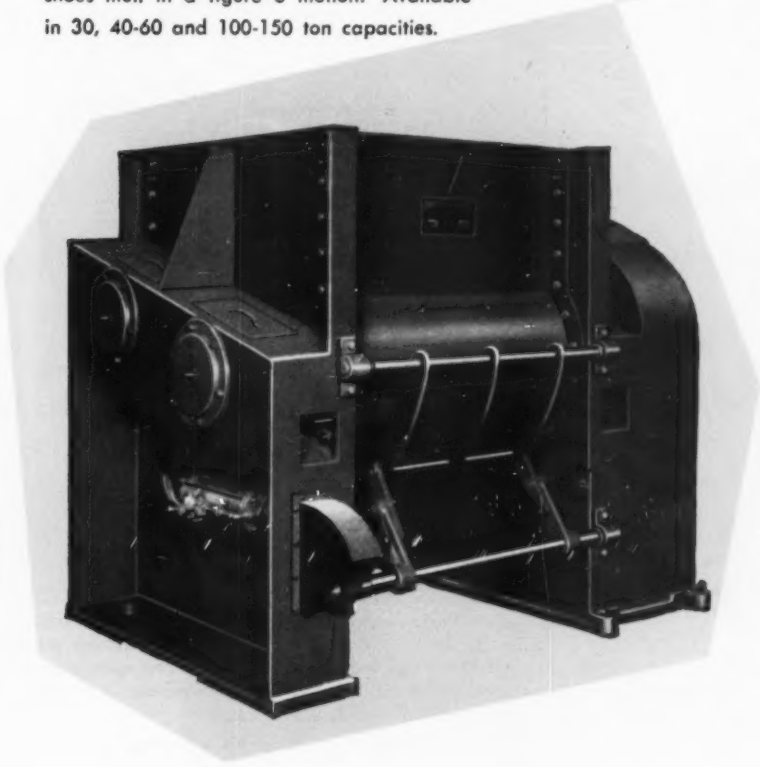
Manufacturers of Blastcrete refractory gun have marketed a new nozzle for shooting refractory materials. This nozzle, constructed on a 90-degree angle turn, is reputed to greatly improve operating conditions wherever refractories are being applied, as well as providing the means for working in very confined areas, such as reverberatory and converter furnaces, cupolas lined down to 24 inches, ladles, and troughs. Although designed for use with Blastcrete gun, it is available for other makes. *Blastcrete Eqpt. Co., Inc.*

For more data, circle No. 7, page 17

Two Baker Perkins sand handling units that help to improve casting quality

Baker Perkins No. 5A Continuous Muller

Baker Perkins No. 5A Continuous Mullers are helping to produce better castings in many large foundries because they get used sand in proper condition for re-use. They will mull up to 100 to 150 tons of core sand per hour on a continuous production schedule. Cast steel sigma type blades with renewable shoes mull in a figure 8 motion. Available in 30, 40-60 and 100-150 ton capacities.



Baker Perkins Unidor Core Sand Mixers

In smaller foundries these batch type mixers can help improve the core sand and thus give better casting quality. They rub, stir and knead all in one operation, distributing a thin layer of bond around each grain to assure 100% benefit from bonds, oils, binders and other compounds. Available in 5½ to 35 cu. ft. working capacities.

BAKER PERKINS INC.
FOUNDRY EQUIPMENT SALES
SAGINAW, MICHIGAN

224

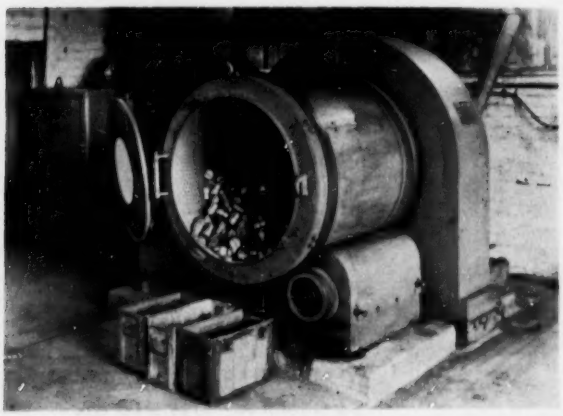
Products & Processes

For additional information, use postcard at bottom of page 17

Improved Crane Scale

Advertised as the "first major advance in crane scales in 25 years," this unit is guaranteed to be accurate within 2/10 of 1 per cent of capacity. Made in 1000, 2000, 5000, and 10,000 lb ranges. *A. H. Emery Co.*

For more data, circle No. 8, page 17



Airless Rotary Blast Cleaning

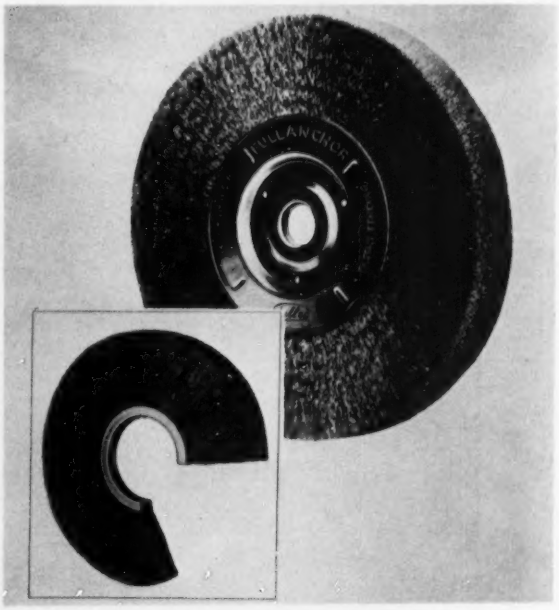
Centriblast airless rotary barrel blast cleaning machine requires no compressed air, handles from four to six 5-cwt loads per hour. Slow speed, 2-rpm, rotation protects delicate castings. Large door ensures speedy loading and unloading. *Stamford Engineering Works.*

For more data, circle No. 10, page 17

New Diesel, Gas Lift Trucks

New 36-model line of industrial lift trucks features maneuverability, short turning radius, precision control. Gas or Diesel powered, trucks offer interchangeability of 85 per cent of all parts. *Buda Co.*

For more data, circle No. 9, page 17



Industrial Wheelbrush

Unique staple anchoring system (see inset) and exchangeable sideplates on this new Fullanchor wheelbrush provide longer brush life, increased maximum wheel speeds, insured balance, and extra safety at no cost increase, according to manufacturer. *Fuller Brush Co.*

For more data, circle No. 11, page 17

THERE'S A TOUCH OF TENNESSEE IN FOUNDRIES

Here is more precision and efficiency for foundry operations in the form of TENNESSEE Silicon-Manganese Briquettes. These cubes, containing exact quantities of silicon and manganese, make it easy to control accurately the alloy content of cupola charges. No weighing is necessary.. each briquette contains one-half pound of silicon and two pounds of manganese. Just count 'em to suit the charge and toss 'em in.

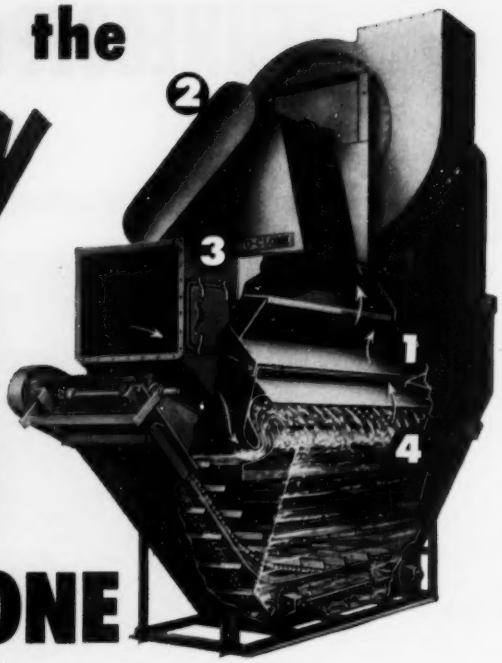
For the foundry field, TENNESSEE also produces Ferro-Silicon and Ferro-Manganese in lump, crushed and briquette forms .. Tenn-Sil additive for molding sand..low-phosphorus and malleable pig iron .. all keys to lower costs and improved products.

The products of TENNESSEE serve many industries everywhere. That's why TENNESSEE is known as an industry serving all industry.

TENNESSEE
PRODUCTS & CHEMICAL
Corporation
NASHVILLE, TENNESSEE

Producers of: FUELS • METALLURGICAL PRODUCTS • TENSULATE BUILDING PRODUCTS • AROMATIC CHEMICALS WOOD CHEMICALS • AGRICULTURAL CHEMICALS

Introducing the NEW DESIGN 4 TYPE N ROTO-CLONE



—1—

Improved and simplified entrainment separators further reduce Type N's low cost maintenance.

—2—

Addition of 4 larger sizes to permit handling of exhaust volumes up to 50,000 cfm.

—3—

Additional access doors with improved hinges.

—4—

Greater range in permissible water over-flow rate from control box.

Famous AAF Hydro-static Dust Collector Loaded with New Features That Reduce Maintenance, Add Life and Lower Cost

"The high dust collecting efficiency of the Type N ROTO-CLONE is written on the records of thousands of plants in scores of industries. Abrasive cleaning, tumbling mills, shakeouts and sand conditioning—all posed dust collection problems in the foundry industry until the addition of this product to the ROTO-CLONE line."

The new Design 4 Type N, while retaining the proven cleaning action of its inverted S-shape water curtain, now adds features to further reduce and simplify maintenance, increase service life and *lower cost.*

Check the features listed here. No Gadgets—just sound engineering improvements that save you money both on first cost and every day of operation. For complete information on the new Design 4 Type N ROTO-CLONE write for Bulletin No. 277B.

Plus ADDED FEATURES FOR EACH TYPE N ARRANGEMENT

Arrangement B (Manual Sludge Removal)

1 Sloping sides for easier, faster manual cleanout.

2 Lower section designed for ready conversion from manual to automatic sludge removal.

Arrangement C (Continuous Sludge Disposal)

Heavier sludge ejector chain with longer chain pitch and slower speed—designed for longer life of all sludge ejector parts.

Arrangement D (Continuous Sluicing)

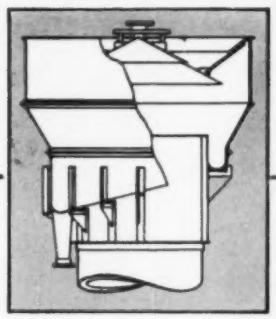
1 New drain control equipped with regulating orifice; built-in flushing connection and lubricated plug valve.

2 New water-supply control, complete with pressure regulator, which automatically assures constant water supply.

You Can Expect the Best from

AAF **American Air Filter**
COMPANY, INC.

104 Central Avenue, Louisville 8, Kentucky • American Air Filter of Canada, Ltd., Montreal, P. Q.



SCHNEIBLE

CUPOLA COLLECTORS

WASH OUT FOUNDRY FLY-ASH AND FUMES TO CUT BUILDING MAINTENANCE COSTS

Here's a modern automotive foundry with 8 Schneible Cupola Collectors on guard against corrosion and deterioration. Fly-ash and fumes cannot play havoc with roofs, gutters, stacks or machinery. Building maintenance is kept at a minimum.

These Schneible Collectors effectively wash out the elements that cause nuisance and sluice them away to dewatering and recirculating tanks for easy removal.

Economy of operation and efficiency are outstanding features of these Cupola Collectors. Water conservation is assured because the dewatering tanks are designed to purge and recirculate the same water continuously. There are no moving parts that require maintenance and the water distribution head cannot clog.

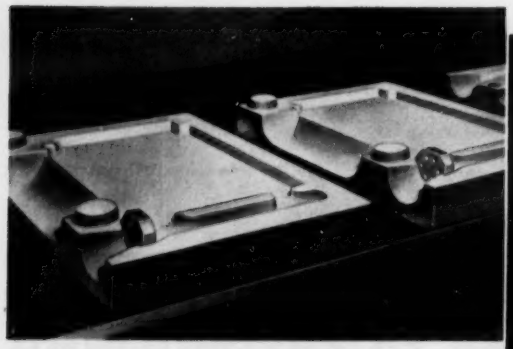
Your local Schneible representative has further information or write direct for bulletin No. 449.

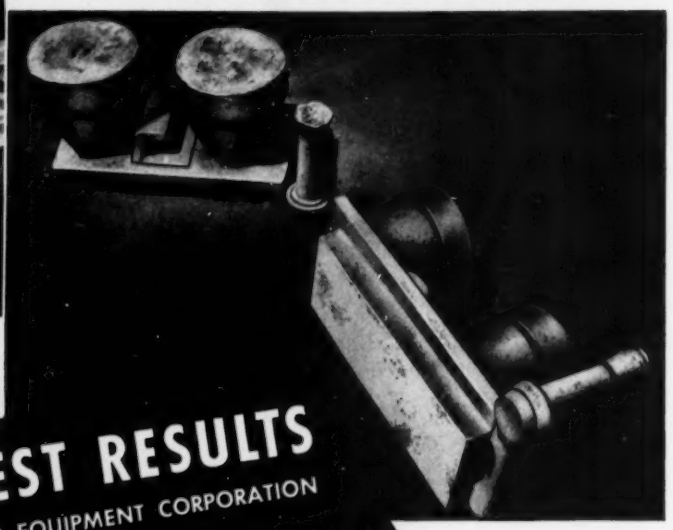
CLAUDE B. SCHNEIBLE COMPANY

P. O. Box 31, North End Station
Detroit 2, Michigan

REPRESENTATIVES IN PRINCIPAL CITIES—CONSULT YOUR LOCAL TELEPHONE DIRECTORY.

PHOTOS COURTESY AMERICAN WHEELABRATOR AND EQUIPMENT CORPORATION





Above: AlSiMag Strainer Cores in gate of mold.
Right: Cores in gates after shakeout. AlSiMag Strainer Cores do not contaminate the scrap but float off in the melt.

COMPARATIVE TEST RESULTS

FROM AMERICAN WHEELABRATOR AND EQUIPMENT CORPORATION
MISHAWAKA, INDIANA

AMERICAN WHEELABRATOR & EQUIPMENT CORPORATION

MISHAWAKA, INDIANA, U. S. A.

June 16, 1953
Our 46th Year

Indiana Products Company
Kokomo, Indiana

Attention: Mr. H. J. Druecker

Gentlemen:

We are pleased to report the results of our tests with the AlSiMag Strainer Cores which you recommended for our application some time ago.

After making these tests, we found that AlSiMag Cores are more economical than the sand cores which we previously used and which we made ourselves.

We have been using your cores in pouring temperatures from 2600 to 2850° F., and since their adoption, we have had no difficulties with inclusions in our castings. We have found AlSiMag Cores highly satisfactory for every use we have put them to in our plant.

Cordially,

Stanley F. Lagarzewski
Vice-President, Manufacturing

AlSiMag®

STRAINER CORES

are

- **"More economical than sand cores"**
- **"Free from difficulties with inclusions"**
- **"Used in pouring temperatures from 2600° to 2850° F."**
- **"Highly satisfactory for every use"**

MAKE YOUR OWN COMPARATIVE TESTS

Samples of standard sizes sent free on request. Special test samples to your specifications made at low cost. Compare them with any refractory or sand core for cost and performance. Let your own tests prove that AlSiMag strainer cores do a better job.
Folder on request.

AMERICAN LAVA CORPORATION

A SUBSIDIARY OF MINNESOTA MINING AND MANUFACTURING COMPANY

CHATTANOOGA 5, TENNESSEE

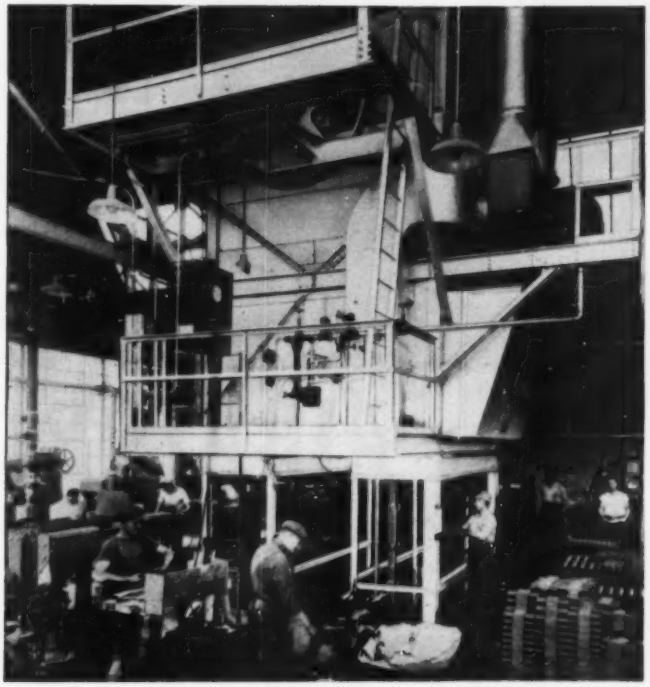
52ND YEAR OF CERAMIC LEADERSHIP

REPRESENTATIVES: M. A. BELL CO., 717 Lombard Street, St. Louis, Mo. • 3201 Sherman Street, Houston, Texas • 3430 Brighton Blvd., Denver, Colo. • CANADIAN FOUNDRY SUPPLIES & EQUIPMENT LTD., 4295 Richelieu Street, Montreal 30, Quebec • 49 Main Street, Toronto 14, Ontario • FIRE BRICK ENGINEERS CO., 7400 South 43rd Street, Milwaukee 1, Wis. • E. J. WOODISON CO., 7415 St. Aubin Avenue, Detroit 11, Mich. • 146 Chandler Street, Buffalo 7, New York • FRED H. McGEE, 1201½ East 7th Street, Chattanooga, Tenn. • SMITH-SHARPE COMPANY, 117 27th Avenue, S.E., Minneapolis, Minn. • SNYDER FOUNDRY SUPPLY CO., 2444 East 57th Street, Los Angeles 58, California • INDIANA PRODUCTS COMPANY, 400 Union Bank Bldg., Kokomo, Ind.

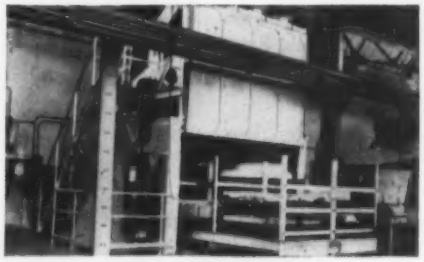
Repeat orders for

COLEMAN OVENS

prove outstanding performance



Coleman Tower Oven at Wells Manufacturing Co.



Coleman Car-Type Core Ovens at Pettibone-Mulliken Co.

Coleman Car-Type Mold Oven at The Bullard Co.

Battery of Coleman Transrack Core Ovens at The Crucible Steel Castings Co.

You should get all the facts concerning the core and mold ovens you expect to install... because the right ovens will increase your production and your profits. Over 80% of Coleman Ovens are "repeat orders" from past customers... proving performance to *complete satisfaction*. Coleman Ovens are the choice of leading firms in every branch of the foundry industry from small shops to large production foundries. You get over 50 years of know-how and experience in every Coleman Oven, so why gamble with inferior designs? Coleman Ovens of proved performance cost no more... and pay for themselves quickly out of savings in fuel, labor and increased production. Get the facts today...

WRITE FOR BULLETIN C

A COMPLETE RANGE OF TYPES AND SIZES

for every core baking and mold drying requirement:

- Tower Ovens
- Horizontal Conveyor Ovens
- Car-Type Ovens
- Transrack Ovens
- Rolling Drawer Ovens
- Portable Core Ovens
- Portable Mold Dryers

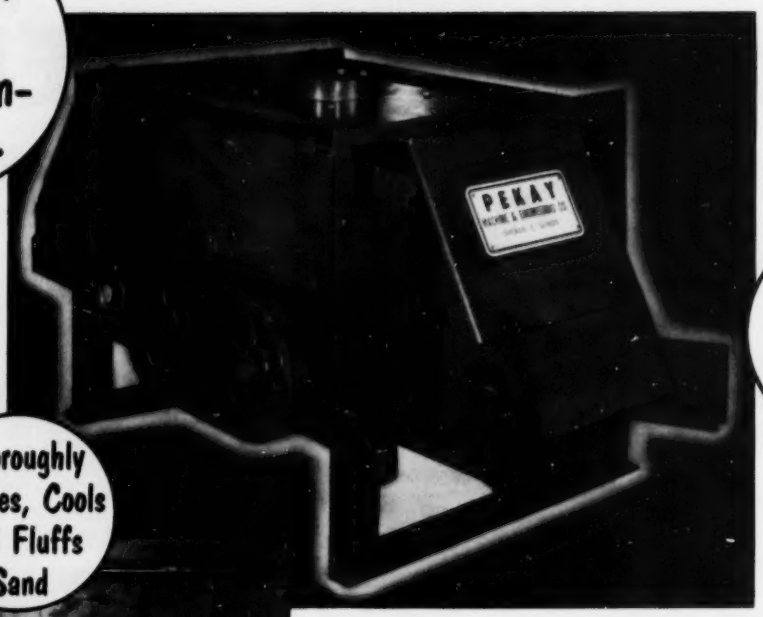
FEMA

THE FOUNDRY EQUIPMENT COMPANY

1831 COLUMBUS ROAD **CLEVELAND 13, OHIO**

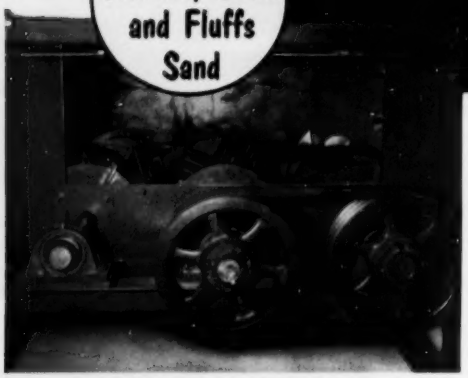
● *world's oldest and largest foundry oven specialists*

Cuts Scrap Loss.. Saves Maintenance..



Stops Lump Trouble..

Thoroughly Aerates, Cools and Fluffs Sand



PEKAY AIRATOR

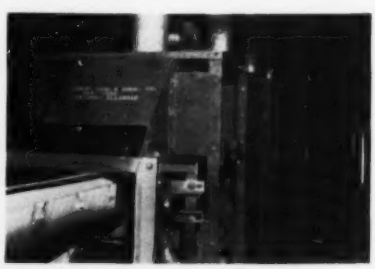
Here's a simple, efficient way to get the profitable production advantages of easy-flowing sand. The soundly engineered PEKAY Airator gives you *total availability* of your production lines at all times. It can't clog or choke up; and protracted line shutdowns are never necessary, even during occasional maintenance work. Parts changing requires no cutting up of equipment.

In day-in, day-out use, PEKAY Airators are cutting scrap losses and reducing machining time for foundries throughout the country. It will cost you surprisingly little to gain these same benefits.

The PEKAY Airator is a sturdily built but very compact unit. It's approximately 2' high (above belt): 6½' long; weighs 800 lbs. You can see the 2 aerating cutter wheels and the aerating fluffing wheel in the picture above (which also shows how easy it is to get at all functioning parts of the unit). These wheels thoroughly *aerate* and *cool* the sand carried directly into the Airator by belt conveyor. Capacity of the unit is practically unlimited.

Remember—with the PEKAY AIRATOR, maintenance is exceptionally simple. Even complete wheel replacement takes only about 2 hours or less, with no blow-torching needed.

Here's another PEKAY development for more efficient, lower-cost foundry sand-conditioning. Units now in use are mulling better sand, with half the bonding material, at a volume increase per hour up to 85%!



PEKAY *Mixer-Muller*

SEND FOR COMPLETE DETAILS, PRICES, TODAY!

Specialists in Foundry Sand-Handling Engineering & Equipment

PEKAY MACHINE & ENGINEERING CO.

869 N. SANGAMON STREET CHICAGO 22, ILLINOIS

M-T-MATIC Elevator Conveyor Buckets
TROFF-O-MATIC Conveyors

Gentlemen:

Please send me details and price information on the PEKAY AIRATOR

NAME _____ TITLE _____

COMPANY _____

STREET & NO. _____ CITY _____ ZONE _____ STATE _____

Products & Processes

Fill out postcard below for complete information on products listed in these pages.

Continued from page 10

CONVENIENT FORM FOR ORDERING INFORMATION

Mudding & Patching Compounds

Organization that pioneered in development of plastic-type mudding and patching compounds for sealing core joints and repairing core defects, now announces new and improved products. New compounds are claimed to be smoother and easier to work, highly refractory, and capable of forming perfect bond which eliminates possibility of gas leakage at core joints. *Delta Oil Products Co.*

For more data, circle No. 12 on card

Portable Exposure Shield

DES, a portable directional exposure shield for the safe handling of strong sources of cobalt-60 for industrial radiography, is announced. Unit can be used for thick or thin sections—from six inches or more down to fraction of an inch. Only one control for exposures. Simple exposure calculations. Equipment requires no maintenance. *Technical Operations, Inc.*

For more data, circle No. 13 on card

Castings Handling Truck

Here is an especially adapted, 6000-lb capacity gas truck that has been designed specifically for the efficient handling of castings, cast iron or steel borings, and steel turnings. Unit operates with a lifting magnet supported on a gooseneck boom. The truck mounts a 36-volt power unit, which supplies the current necessary to energize the lifting magnet. Fingertip controls are provided for raising the load and energizing the magnet. They are located within easy reach of the operator, who has positive control of the vehicle at all times. The lifting magnet can be hung at any one of four different positions on the boom, and the hook capacity varies from 4700 lb at 36-in. outreach, to 3000 lb at 72-in. outreach. Complete information on new equipment is available from manufacturer upon request. *Yale Materials Handling Division, Yale & Towne Mfg. Co.*

For more data, circle No. 14 on card

Compressed Air Purifier

Vi-Speed Dehumidifer is self-cleaning device that purifies compressed air and reduces humidity to very low dew point. New improvements include self-adjusting nozzle coupled with non-clogging aspirator. Exclusive, self-cleaning drying agent compounded to cover wide range of line temperatures from 100 F to below freezing. Always safe in flammable areas. *Van Prods. Co.*

For more data, circle No. 15 on card

Fork Truck Scoop Attachment

A scoop attachment has been designed for use with any of this company's hydraulic-powered fork trucks. It is intended to handle bulk materials, but not loads where lumps are large. Hydraulic power comes from same system which operates lift and tilt on vehicle. Anti-friction bearings support trunnions of scoop; double-acting hydraulic cylinder moves unit from loading to carrying position. Overall width is 87¼ in., cubic content 25 cu ft, and capacity is 3200 lb (maximum capacity determined by truck capacity). *Elwell-Parker Co.*

For more data, circle No. 16 on card

Reader Service Dept.

5319

Please send me detailed information on the Products and Processes.

1	2	3	4	5	6
7	8	9	10	11	12
13	14	15	16	17	18
	19	20	21	22	

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TITLE

COMPANY

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CITY AND ZONE

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BUSINESS REPLY CARD

First Class Permit No. 14680, Sec. 34.9 P. L. & R., CHICAGO, ILL.

Reader Service

AMERICAN FOUNDRYMAN

616 S. Michigan Avenue

Chicago 5, Illinois

Free Foundry Information

For additional information use postcard at bottom of this page

Foundry Facings

Information on latest developments in foundry facings field. Twelve technical bulletins prepared by customer service laboratory contain up-to-date research data and the answers to many foundry facings problems. Included are improvements in sand conditioning, new technique in mold surfacing, core pasting ideas, preparation of core wash solutions, coating skin-dried and dry sand molds, and the use of solvent products in the foundry. *Frederic B. Stevens, Inc.*

For more data, circle No. 17 on card

Fan Engineering Manual

Complete, 64-page, illustrated guide to modern industrial ventilation and air movement problems. Engineering, installation, and operating data for all types of standard and special-duty fan applications. Pertinent details for calculating duct sizes, friction losses, performance, and horsepower requirements. Full details and description of company's complete line of fans and accessory equipment. Contained in catalog. No. 20. *Aerovent Fan Co., Inc.*

For more data, circle No. 18 on card

Ductile Iron Castings

New 12-page booklet on industrial castings of Ductalloy now available. Properties, physical and chemical characteristics, and applications are described for three standard grades of Ductalloy, produced by two divisions of the company. Book illustrates typical castings for use in aviation, chemical, diesel, and other general industrial fields. *American Brake Shoe Co.*

For more data, circle No. 19 on card

Core and Mold Ovens

New bulletin 53-CM offers opportunity to compare engineering features when selecting foundry ovens. Generously illustrated with line drawings of through sections and photographs of interior construction. These features and other data make it possible to carefully study and compare company's line of foundry ovens before making a selection. Bulletin includes something new in vertical core ovens. *Carl Mayer Corp.*

For more data, circle No. 20 on card

Wire Rope Fittings

Comprehensive tables for selecting fittings for fastening wire rope to riggers, erectors, excavating machinery and other fields requiring quick, easy way to attach wire rope. The fittings, manufactured of special heat-treated cast steel, are strong and durable. They are furnished painted and are also available galvanized, if ordered in sufficient quantity. Full specifications included. *Sauerman Bros., Inc.*

For more data, circle No. 21 on card

Non-Ferrous Specifications Handbook

182 page compilation of various specifications issued by government agencies and metallurgical societies on all standard brass, bronze and aluminum foundry alloys and fabricated shapes. Included are fundamental metallurgical and foundry data and a collection of tables selected for their practical value. New in the handbook are a chapter on physical properties and test bars, a list of various "named" alloys with their nominal chemical composition, and specifications on solders and anti-friction alloys. *North American Smelting Co.*

For more data, circle No. 22 on data

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Reader Service
AMERICAN FOUNDRYMAN
616 S. Michigan Avenue
Chicago 5, Illinois

Reader Service Dept.

53|9

Please send me detailed information on the Foundry Information circled.

1	2	3	4	5	6
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★ **Please print or type information below**

NAME

TITLE

COMPANY

ADDRESS

CITY AND ZONE

"Facing" Facts

FROM STEVENS FACING DEPARTMENT

...THEY'RE BOTH GEMS!

DIAMONDS ARE A CRYSTALLINE FORM OF PURE CARBON, AND STEVENS PLUMBAGO IS MADE FROM CRYSTALLINE CARBON THEY'RE BOTH GEMS!

CEYLON
THE WORLD'S *FINEST* GRAPHITE FOR PLUMBAGO IS FOUND IN CEYLON ...AND STEVENS USES CEYLON EAST INDIA GRAPHITE.

FUSION POINT UNKNOWN!
THE HOTTEST BLOWTORCH CAN'T MELT STEVENS PLUMBAGO. IT WITHSTANDS HEAT ABOVE 6300°F.!

28 TIMES AROUND THE WORLD!
STEVENS SOLD ENOUGH PLUMBAGO LAST YEAR TO COAT A 3-LANE HIGHWAY CIRCLING THE GLOBE 28 TIMES!

PLUMBAGO DICTIONARY!
PLUMBAGO...KNOWN FOR HUNDREDS OF YEARS...HAS HAD MANY NAMES. "BLACK LEAD," "POTELOT," "GRAPHITE," "CARBO MINERALIS," "CRAYON NOIR". NO MATTER WHAT IT'S CALLED... STEVENS PLUMBAGO CAN DO THE JOB.

THE WORLD'S FINEST GRADE.. ..STEVENS PLUMBAGO!

For over 50 years Stevens Ceylon East India Plumbago has been a foundry favorite. And no wonder! Here are just a few of its many foundry uses. It can be:

- **Used dry as a mold coating**
- **Mixed with molasses water and used as a mold wash**
- **Added to core washes to increase heat resistance**
- **Used as an additive to sand, to give a heat resistant coating on each sand grain**

Why not let versatile Stevens Ceylon Plumbago improve the quality of your castings. Send us information on your particular operation . . . we'll send correct working samples of Stevens Plumbago and a copy of Stevens Technical Bulletin F-107, "The Use of Plumbago." FREDERIC B. STEVENS, INC., DETROIT 16, MICHIGAN.

See us at National Metal Exposition
Cleveland, Ohio • October 19-23
Booths 2547-55

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STEVENS
INCORPORATED
EVERYTHING FOR A FOUNDRY

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A product for EVERY

• Your Widest Choice of Abrasives for Every Operation

PRODUCTS	SNAGGING or ROUGH GRINDING	DEBURRING	WELD GRINDING	SMOOTHING EDGES	FINISHING and POLISHING	DIE GRINDING
Straight Wheels	✓		✓		✓	✓
Rubber Bushed Straight Wheels	✓		✓			
Mounted Wheels		✓	✓	✓		✓
Cup Wheels	✓		✓			
"MX" Straight Wheels	✓	✓	✓		✓	✓
"MX" Mounted Wheels		✓		✓	✓	✓
"MX" Discs and Depressed Center Wheels	✓	✓	✓	✓	✓	
Coated Abrasive Discs		✓	✓	✓	✓	✓
Coated Abrasive Bands and Sleeves		✓		✓	✓	✓
Cartridge Rolls		✓		✓		✓
Coated Abrasive Belts with "Port-A-Belt" Grinding Attachment	✓		✓		✓	✓

...from CARBO

TRADE

"Carborundum," "MX" and "Port-A-Belt" are trademarks of The Carborundum Company, Niagara Falls, N. Y.

PORTABLE GRINDING job

Deburring with slotted discs. You can choose the deburring method best for you from at least 7 abrasive products by CARBORUNDUM.

Weld clean-up with rubber-bushed straight wheel by CARBORUNDUM...one of 8 ways you can grind welds with portable equipment.

Rough grinding with straight wheel. This job could also be done economically with abrasive belts and the Port-A-Belt grinding attachment by CARBORUNDUM.

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CALL YOUR CARBORUNDUM DISTRIBUTOR TODAY. He offers experienced counsel, complete stocks, prompt delivery.

RUNDUM

MARK

...the ONLY source for EVERY abrasive product you need

Letters to the Editor

All letters of broad interest which do not violate A.F.S. policy or good taste are publishable. Write to Editor, American Foundryman, 616 S. Michigan Ave., Chicago 5, Ill. Letters must be signed but will be published anonymously on request.

Thermal Stability of Sand

I should like to call your attention to errors in the report of my presentation at a Sand Shop Course session of the recent AFS Convention, published in the June issue of AMERICAN FOUNDRYMAN. You report: "Thermal shock resistance is better if the base sand is subangular to angular, he stated, recommending coarser sand or addition of cellulose material to improve thermal stability."

I said: "It is more difficult to formulate sand mixes possessing ideal thermal shock characteristics when the basis sand is predominately subangular to angular in sand grain shape. The proper ratio of mineral and organic binders will result in a molding sand having ideal thermal shock characteristics. This ratio may be 1 cereal to 3 bentonite if the sand grains are predominately rounded. A greater ratio of mineral binder to cereal binder is required if the sand grains are predominately subangular to angular.

"Excessive expansion and contraction contribute to poor thermal stability and may be reduced by selection of a slightly coarser grain size sand, or the introduction of some cellulose material."

HENRY W. MEYER
General Steel Castings Corp.
Granite City, Ill.

Program Pays Off

I read with great interest in the June issue of the AMERICAN FOUNDRYMAN the report of the Round Table meeting held in Texas (*"Non-Ferrous Melting—Working Tips and Ideas,"* pp. 48-55). As I read the discussions and comments of the various individuals, one fact stood out from all others. It is quite apparent that the Educational Program of AFS and the efforts of all those who have been trying to inform the foundrymen have not been in vain.

The discussion by the participants of the Round Table indicated familiarity with good foundry practice and an understanding of the technology in back of good foundry practice. This is encouraging to me and all others who, by virtue of articles written for foundry publications and talks given to AFS chapters, have been striving to establish a better understanding of the fundamentals that control many foundry operations.

That representatives of a number of capable foundries should discuss these subjects on the level that they did is to my mind a real sign of progress in our industry.

May I encourage AFS to carry on such activities in other localities and to continue to report them in AMERICAN FOUNDRYMAN since they make interesting reading as well as containing much worthwhile information.

R. A. COLTON, *Sales Mgr.*
Federal Metal Div.
American Smelting
& Refining Co.
Barber, N. J.

Permission Gladly Granted

Nous avons récemment pu, grâce a l'obligeance de la Battelle Institute Paris-Brance, présenter à nos membres le film intitulé: "Gating to Improve Casting Quality" édité par votre Société.

Etant très désireux de pouvoir publier dans notre revue *Fonderie* un compte rendu détaillé de ce film appuyé de photographies, nous venons vous en demander l'autorisation.

Nous espérons recevoir votre accord sous peu afin de nous en permettre la publication dans un de nos très prochain numéro.

Avec nos remerciements, nous vous prions d'agréer, l'expression de nos sentiments distingués.

R. DELPUECH, *Admin. Sec.*
Association Technique
de Fonderie,
Paris, France

We are happy to grant permission to publish a detailed report of the AFS film on Society-sponsored research in Fonderie.

Can Anyone Help?

I am trying to locate information on a great uncle named Klein who owned an iron foundry in the United States during the year 1910. Many years ago he came to this country from Hungary. He died a bachelor sometime around 1912, 70 or more years old, leaving nine million dollars. An item came out in the official Hungarian paper searching for his heirs. Lawyers from Budapest came to America to see what could be done to collect the money, but the first world war broke out and the whole thing was dropped.

We will appreciate any help anyone can give us.

Mrs. Morris Thirman
217 S. El Paso St.
El Paso, Texas

Crucible No Ladle

I have just gotten around to reading the Post Convention issue of AMERICAN FOUNDRYMAN and note on page 46 the picture of the ceremonies at the Annual Banquet. I am very much disappointed in the caption.

You distribute a fine publication entitled *"Glossary of Foundry Terms"* so we will be kept straight and use the correct word. Yet, the caption writer refers to "pouring the flaming brandy from a ladle" when anyone can see it is a CRUCIBLE.

At the Banquet, it was a real thrill to see that crucible the center of all eyes.

DICK STONE
Vesuvius Crucible Co.
Pittsburgh, Pa.

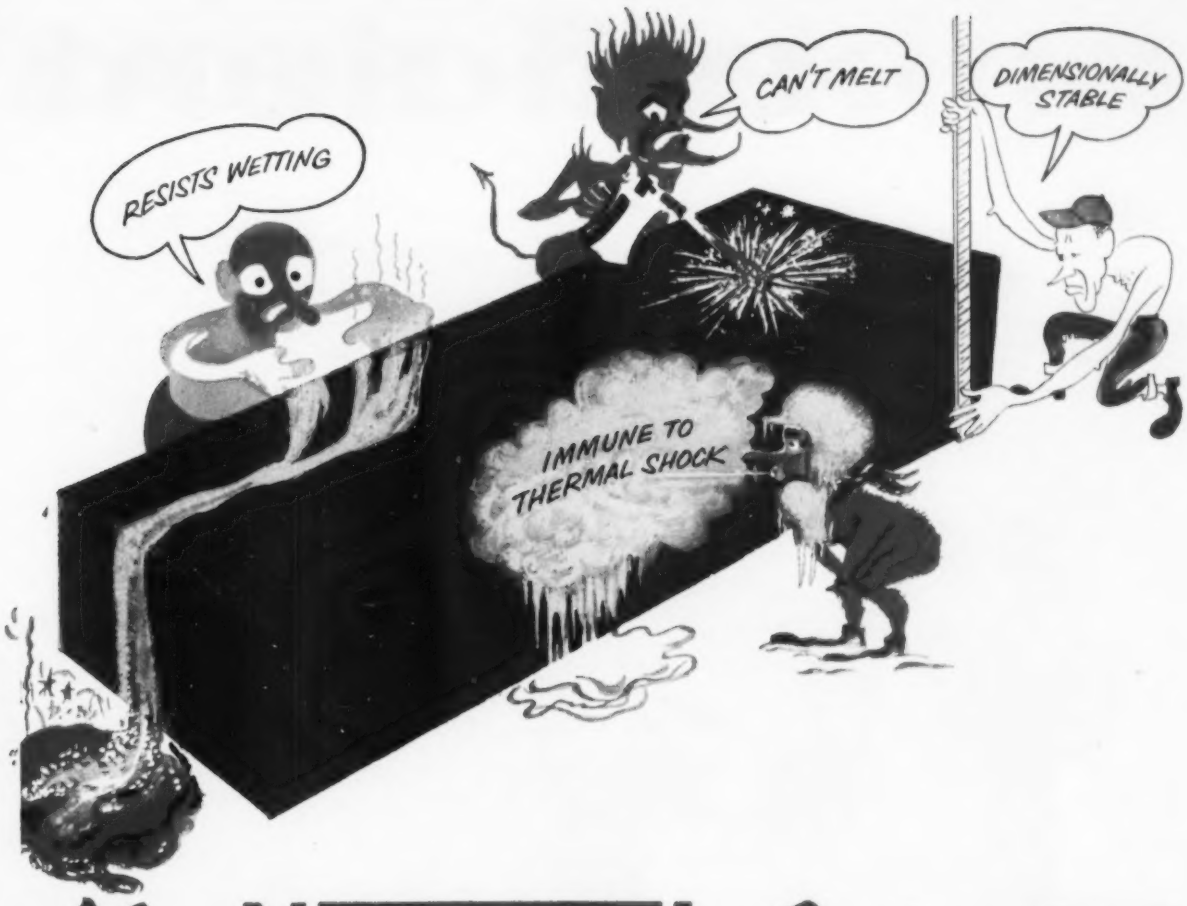
Trade School Hears Pfeiffer

Albert F. Pfeiffer, Pattern & Foundry Div., Allis-Chalmers Mfg. Co., Milwaukee, and President, Milwaukee Chapter, AFS, recently spoke to patternmakers and foundrymen apprentice dinner guests in Chicago. His subject, "Coordinated Function of Pattern Equipment and Casting," was illustrated with slides. A question period followed the presentation.

About 150 guests attended the dinner, which was sponsored by Chicago's Washburne Trade School. Although primarily designed as an educational function for the young students, the industry was also well represented by foundry employees, management, superintendents, foremen, and journeymen. Officials of the patternmakers' and molders' unions, pattern manufacturers' associations, and the Joint Apprentice Committee attended.

Mr. Pfeiffer has spent 46 years in the foundry industry, working with steel, cast iron, malleable iron, and nonferrous metals.

The Industrial Hygiene Foundation, Pittsburgh, Pa., has just printed a copy of proceedings of a meeting on the "Legal Aspect of Industrial Noise."



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TRADE-MARK

KEEP THESE STANDARD SIZES ON HAND FOR EMERGENCY!

13½" x 6" x 3" series
9" x 6" x 3" series
2" x 4½" x 2½" series

☆

Write for Catalog Section S-6210

If you think of carbon only in terms of complete furnace linings, check these other important locations in and around the furnace where "National" carbon brick and shapes will also save time and money as a maintenance refractory:

- ✓ ***RUNOUT TROUGHS***
- ✓ ***CINDER NOTCH LINERS***
- ✓ ***CINDER NOTCH PLUGS***
- ✓ ***SPLASH PLATES***
- ✓ ***SKIMMER PLATES***

. . . and Many More!

The term "National" is a registered trade-mark of Union Carbide and Carbon Corporation

NATIONAL CARBON COMPANY

A Division of Union Carbide and Carbon Corporation, *30 East 42nd Street, New York 17, N. Y.*

District Sales Offices: Atlanta, Chicago, Dallas, Kansas City, New York, Pittsburgh, San Francisco

In Canada: National Carbon Limited, Montreal, Toronto, Winnipeg

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Tough Space Problem Solved And Manpower Needs Cut 50%
First Year of Operation Brings Better Than 105 Percent Return
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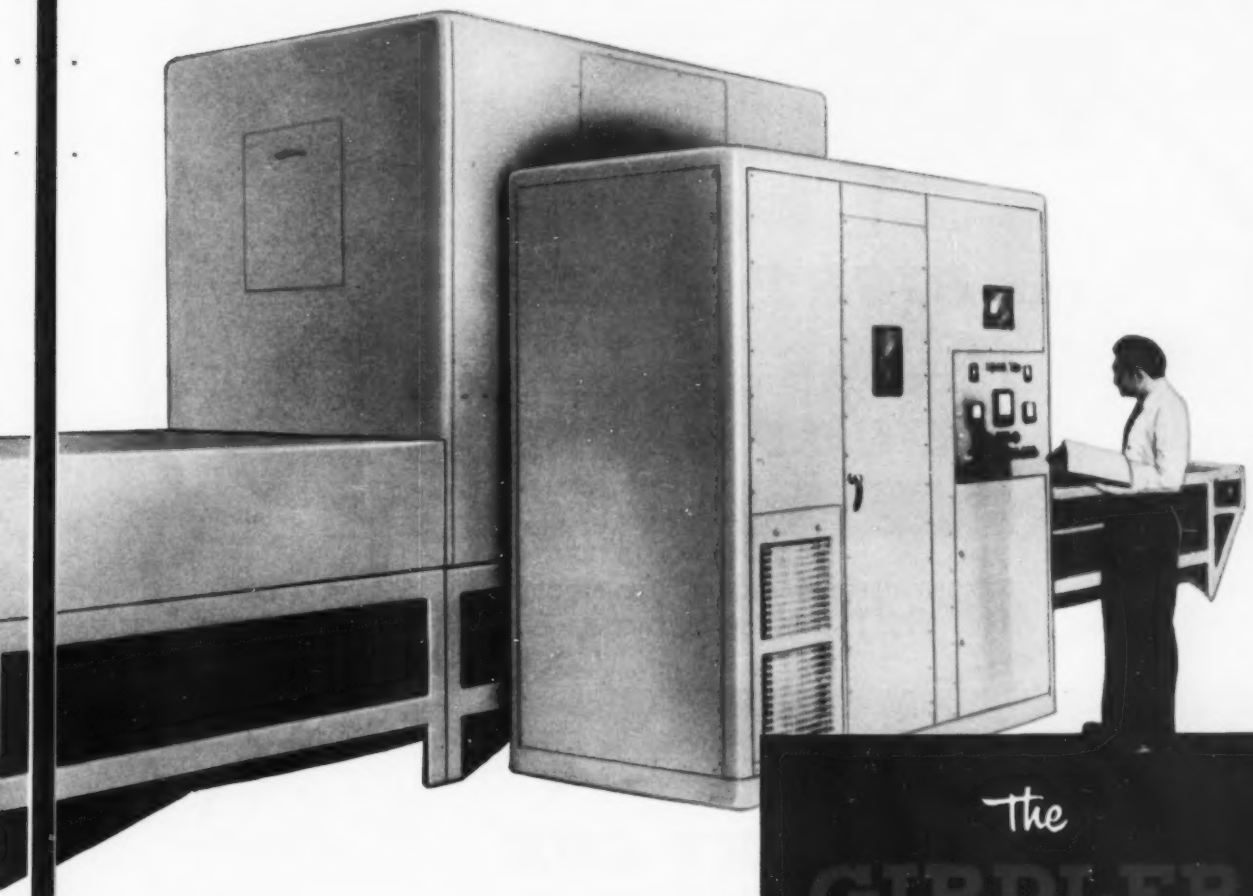
These sample case stories from a new THERMEX booklet are based on authorized studies in leading foundries — showing greater core room yields, fewer rejects and reduced costs. THERMEX Core-baking Equipment bakes cores electronically in a *matter of minutes,* and outputs of 15 tons of sand cores per hour can be achieved.

Girdler has unmatched experience in electronic heating and baking, dating from the first industrial dielectric heating installation, which is still in daily use. Girdler has provided more installations for the foundry field than any other manufacturer, and an impressive group of companies have re-ordered THERMEX Core-baking Equipment.

Be sure that your core-baking operations are new-fashioned. Write today for THERMEX booklet T200, containing comparative cost figures for old and new methods of core-baking. The Girdler Company, Thermex Division, Louisville 1, Ky.

core-baking



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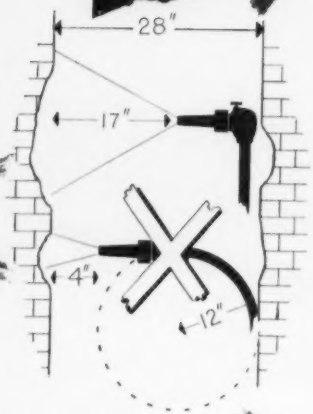

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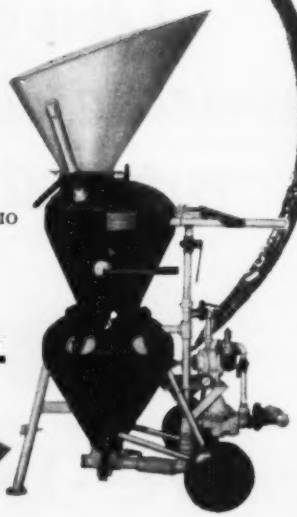

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Today's keener competition emphasizes the need for higher quality production with fewer man-hours per unit. A comprehensive study of facilities and methods with little capital expenditure frequently permits substantial cost reductions.

Knight Engineers have made many such studies and will be glad to discuss your particular problems at no obligation. Whatever your foundry problem, you'll benefit by the broad experience of the Knight organization which has successfully completed more than 200 foundry assignments. For prompt attention, call our Chicago or New York office.

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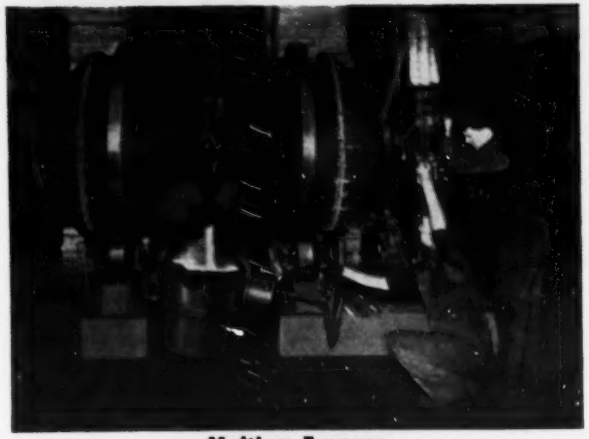


Melting Furnace

Courtesy of Ford Motor Co. Ltd.

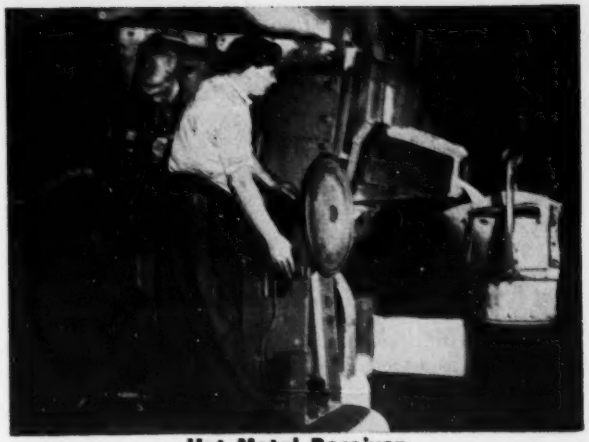
SOLE REPRESENTATIVES FOR THE UNITED STATES

REVOLUTIONARY FEATURES

TABLE I—FUEL CONSUMPTION AND MELTING TIMES OF 2 TON ROTARY FURNACE

Metal	Pouring temperature (°F)	Consumption per ton (gal.) No. 6 oil	Time per melt (min.)
Steel	2822	35	120
High-duty iron	2570/2642	30	100
Malleable	2552	30	120
Copper	2282	18	100
Gunmetal	2084	15	90
Aluminum	1202/1328	8	45

- **Economy** . . . 28 gal. per ton heavy oil. Charges up to 30% borings. Charging and pouring requiring only one man.
- **Flexibility** . . . Capacity from one to 40,000 lbs. Intermittent pouring from ten to ninety minutes.
- **Control** . . . Complete push button operation. Perfect alloying and temperature control.
- **Refractory costs** . . . Approximate life of lining:
  1. Steel 50 heats
  2. Malleable 125 heats
  3. Gray Iron 150-200 heats
  4. Aluminum 2 years



Hot Metal Receiver

Write for booklet

STAMFORD ENGINEERING WORKS

STAMFORD, CONN.

Foundrymen in the News

At the annual stockholders meeting of the Whiting Corp. at Harvey, Ill., the following directors were re-elected: **Stevens H. Hammond, Thomas L. Hammond, J. A. Handley, J. Clyde Thomas, John B. Dunbar, Fred M. Gillies,** and **Boyd N. Everett. S. H. Hammond** was also re-elected chairman of the board. Re-elected officers were: **J. A. Handley,** president; **M. J. Rice,** vice-president in charge of engineering; **G. E. Seavoy,** vice-president in charge of sales; and **T. L. Hammond,** vice-president.

W. W. Kerlin has been appointed manager of service engineers, Meehanite Metal Corp., New Rochelle, N. Y. Mr. Kerlin has been with Meehanite for over 20 years as a member of the service staff, operating from the Cleveland office. He had previously been

W. W. Kerlin . . . new manager

associated with Battelle Memorial Institute, Columbus, Ohio, and will now make his headquarters at the New Rochelle offices of the corporation. He will direct the activities of the entire service staff.

Peninsular Grinding Wheel Co., Detroit, has appointed **Forrest R. Old** as sales manager. Mr. Old became a sales representative in the Detroit district

F. R. Old . . . Peninsular promotion

office in 1944, served as assistant district manager for four years at Cleveland, and was appointed assistant sales manager in 1952.

Richard M. West, formerly assistant advertising and sales promotion manager, has been promoted to advertising manager of Osborn Mfg. Corp. Mr. West joined the Osborn sales depart-

R. M. West . . . advertising head

ment 10 years ago, covered a sales territory for two years, and became a sales engineer in 1951. He was appointed assistant advertising and sales promotion manager in November, 1952.

New sales engineer at the west coast plant of Apex Smelting Co., of Chicago, is **John J. Stobie,** who will operate out of Long Beach, Calif.

Carl E. Rowe & Co., Milwaukee, announces the addition of **John J. Meadows** as chief engineer, mechanical and electrical engineering division. Mr. Meadows' experience in industrial engineering is very comprehensive. He was most recently associated with Askania Regulator Co., Chicago.

Henry L. Martin, formerly with Battelle Memorial Institute, Columbus, Ohio, is now associated with the Chrysler Corp., Engineering Div., Missile Branch, Detroit.

J. B. Forker, president, Forker Corp., has announced the appointment of **Virgil E. Slater** as sales manager. The company is very active in the tramrail field, and produces heavy transfer

V. E. Slater . . . sales manager

bridges, transfer cranes, and a shielded, safety-type electrification system. Mr. Slater has specialized in tramrail design and engineering for a quarter century.

continued on page 30

B. B. Williams (right) chairman of the board, Cooper-Bessemer Corp., is shown as he was awarded the Alumni Medal of Oberlin College. Dan T. Bradley (left), president of the Oberlin Alumni Assn., presented the medal and expressed the gratitude of the College for the warm interest and devotion shown by Mr. Williams through many years of service to the institution.

Foundrymen in the News

continued from page 29

H. L. Ingram, Jr., special Washington (D.C.) representative of Air Reduction Sales Co., New York, has been appointed manager of the company's technical development department. The department includes four sections: Aircomatic, metallurgical, technical market development, and process development laboratory.

W. C. Mason has been added to the staff of Almont Mfg. Co., Almont, Mich. He will function as general manager of the organization. Mr. Mason was formerly affiliated with Hall and Liles, Detroit, for seven years, specializing in foundry management.

Amedee Roy Laval, graduate of Illinois Institute of Technology, was recently added to the faculty of that institution as instructor in metalurgical engineering.

David E. Clark has been appointed traffic manager of Bohn Aluminum & Brass Corp., according to a recent announcement by S. D. Den Uyl, president of the firm. Mr. Clark has been with Bohn for five years.

Charles Taylor Sons Co., Cincinnati, announces that the firm will be represented in St. Louis by **Donald K. Schleiffarth,** who will take over the post from his father, **A. O. Schleiffarth,** who died on July 7 at his home in Webster Groves, Mo. The elder Mr. Schleiffarth had been with the firm since 1940. The organization, a subsidiary of National Lead Co., manufactures special refractories.

Manly B. Brown has been elected vice-president in charge of marketing, Great Lakes Carbon Corp., Chicago. Mr. Brown came to Great Lakes after 17 years with Republic Steel Corp., the last 13 as sales manager of the pipe division. He will assist the corporation's six product divisions in the fields of marketing (including the development of marketing plans), sales organization, and marketing procedure. The corporation has its national headquarters in New York and operates 15 plants across the country.

Sam Tour & Co., Inc., New York, has recently added **Joseph Stein** to its staff, as supervisor of the non-destructive testing division. Mr. Stein obtained his ME degree from the University of Zurich in 1936 and has had broad experience in various phases of the atomic energy program. In his new post, he will supervise laboratory and field testing projects, using radiographic, sonic, ultrasonic, and other types of non-destructive testing techniques.

R. G. Pence and **J. W. Cleveland,** together with **John T. Brown,** have formed the Rajac Equipment Sales Corp. for the sale of miscellaneous foundry equipment in the midwestern states. Offices will be located in Lincolnwood, Ill. Both Pence and Cleveland have been with Hydro Blast Corp. for the past 12 years in the field engineering and sales work. John T. Brown is an attorney, practicing law in Chicago. The new firm will cover primarily Illinois, Ohio, Michigan, Wisconsin, and Indiana.

Sterling Abrasives Division of Cleveland Quarries Co., Tiffin, Ohio, announces the appointment of **Philip de Veau** as sales engineer for the state of Wisconsin. He has had wide industrial sales experience, having previously been a manufacturer's agent for the M. B. Austin Co.

Election of **F. Milford Taylor** to the board of directors of the Bohn Aluminum & Brass Corp. has been announced. Mr. Taylor, who is treasurer of the corporation, joined the firm in 1919.

J. C. Merwin has been elected by the board of directors of Chain Belt Co. to the position of chairman of the board, with **L. B. McKnight** succeeding him as president and chief executive officer. McKnight joined the company in 1927 as sales manager of a subsidiary, entered the parent company in 1932 in Milwaukee.

Leslie L. Hotsenpiller has been elected vice-president for manufacturing of the National Radiator Co., Johnstown, Pa. He has held the title of director of manufacturing since August, 1952. Mr. Hotsenpiller came with National last year after serving in an executive capacity with North American Aviation Corp. and Curtiss-Wright Corp.

Basic Refractories, Inc. has established three new sales districts. **C. R. Heilig** has been named sales manager of the newly created central district and will also handle agency sales on the west coast, in Canada, and in the export operations. His offices will be at the Cleveland general headquarters of the firm. **G. W. Edwards** has been appointed assistant manager for the new district. **J. D. Hysong** will head the new midwestern sales district, while the eastern and New England districts will be handled by **D. B. Baxter,** who has been associated with the firm since 1945.

The appointment of **F. B. O'Mara** as manager, metallurgical carbon sales, has been announced by National Carbon Co., a division of Union Carbide & Carbon Corp. Mr. O'Mara has been with National since 1936, when he graduated from Purdue University. He has held various positions in manufacturing and industrial sales departments, leading to his present appointment.

Robert M. Parke has been named manager of the materials and processes section of the metallurgy research department, General Electric Research Laboratory. He will be in charge of a group of scientists engaged in pilot plant operations, which form an essential step between new laboratory developments in metallurgy and their practical application.

Ralph D. Parker has been recently elected president of Canadian Nickel Co., Ltd., subsidiary of International Nickel Co., Inc. The organization conducts the exploration and prospecting program for the parent company. Mr. Parker has been vice-president and a director of Canadian Nickel Co., Ltd., since May, 1952. He originally joined International Nickel in 1928, becoming superintendent of Inco's Creighton Mine near Copper Cliff, Ontario. In 1935 he became general superintendent of the mining and smelting division, and in 1947 was appointed assistant vice-president of International Nickel Co. of Canada, Ltd. Since joining Inco, Mr. Parker has had worldwide experience in the search for and examination of nickel occurrences.

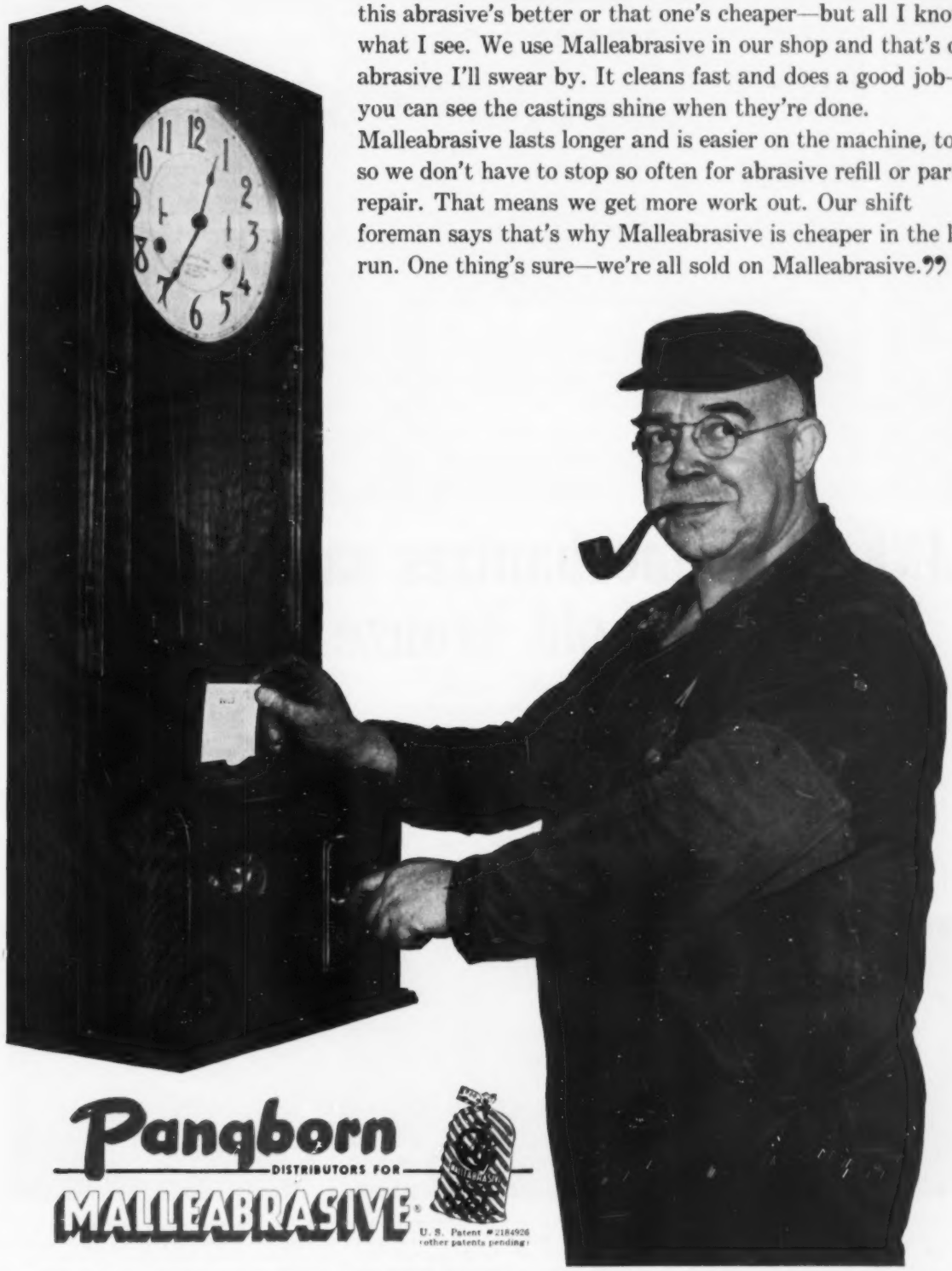
AFS Headquarters Seeks Old *Transactions*

National headquarters of AFS has an urgent need for used, case-bound volumes (not quarterly) of the official society publication *Transactions.*

The years specifically sought are 1930-1952, inclusive. Books must be in good condition, and will be purchased at $2.50 each.

The demand for back issues of *Transactions* results from the constantly increasing membership of the society. Copies should be mailed to Book Section, American Foundrymen's Society, 616 So. Michigan Ave., Chicago 5, Illinois.

"I don't know anything about fancy claims. I've heard how this abrasive's better or that one's cheaper—but all I know is what I see. We use Malleabrasive in our shop and that's one abrasive I'll swear by. It cleans fast and does a good job—you can see the castings shine when they're done. Malleabrasive lasts longer and is easier on the machine, too, so we don't have to stop so often for abrasive refill or parts repair. That means we get more work out. Our shift foreman says that's why Malleabrasive is cheaper in the long run. One thing's sure—we're all sold on Malleabrasive."



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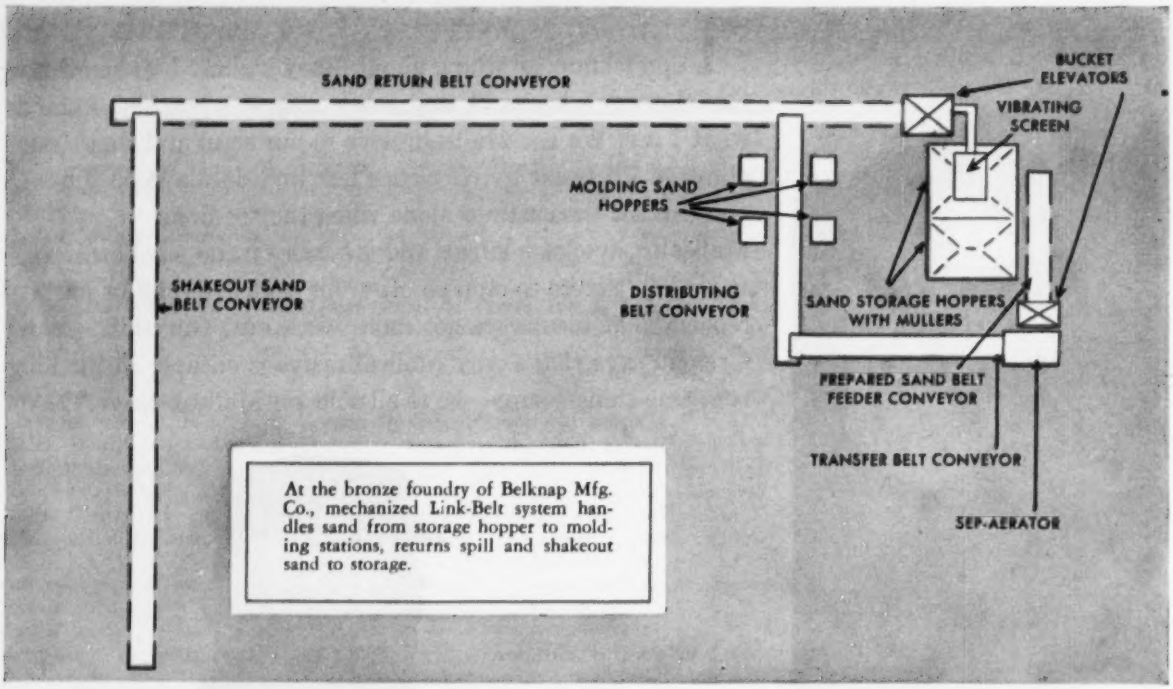
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SAND STORAGE HOPPERS WITH MULLERS
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At the bronze foundry of Belknap Mfg. Co., mechanized Link-Belt system handles sand from storage hopper to molding stations, returns spill and shakeout sand to storage.

LINK-BELT mechanizes sand handling at 90-year-old bronze foundry

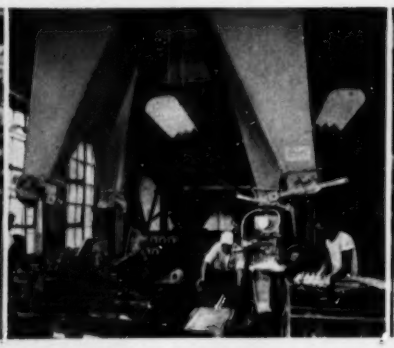
LIKE many other plants, the Belknap Manufacturing Company, Bridgeport, Conn., required increased production to meet postwar demand for its bronze valves. Yet labor shortages dictated an answer other than additional manpower. The solution: an unusual mechanization of their 90-year-old foundry, featuring a complete Link-Belt sand handling system. The results: typical Link-Belt economy and efficiency . . . improved casting quality . . . better working conditions.

Let a Link-Belt engineer demonstrate how modernized handling methods can increase production and reduce costs in your foundry. Simply call the Link-Belt office nearest you.

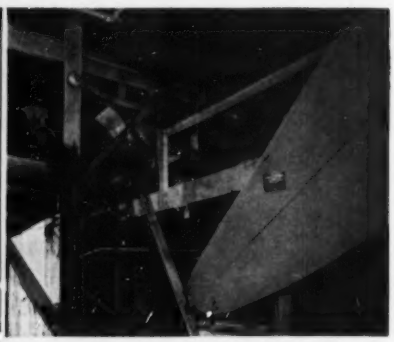
LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

Distributing belt conveyor, 18 in. wide and 28 ft. long, receives sand from preparation unit via bucket elevator. Hand-operated plows then divert it to molding hoppers.



Link-Belt molding sand hoppers reduce molding time. Spill sand falls through grate onto belt conveyor. In background, two Link-Belt bucket elevators and storage bin.



Two belt conveyors return molding sand for preparation. Conveyor at top feeds spill sand onto lower belt which is returning shakeout sand. Series 100 idlers are used.

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices in Principal Cities.

19,335

Putting the Shoe on the Other Foot . . .

■ What does a plant do when residential neighbors move into an industrial area and then start "standing up for their rights?"

For years industry has been required to confine its operations to zones set aside to avoid deterioration of residential property values. In a number of cases, plants purposely have been placed at some distance from residential areas to avoid becoming a nuisance. Plants so located now find themselves, in some instances, an integral part of a residential area. As such, they may be required to meet—often at great cost—stringent limitations on smoke, vibration, particulate matter emissions, noise, fume and the like. Such plants, through no fault of their own, are now criticized or condemned by the communities their taxes help support.

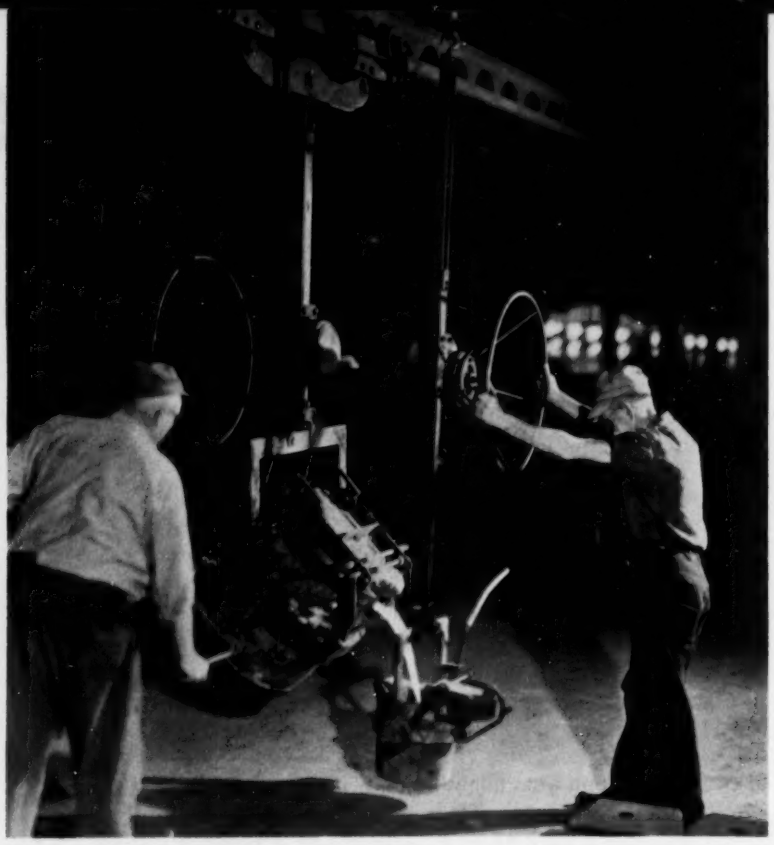
Residential encroachment on what might logically be considered industrial territory doesn't necessarily require a generation to develop. Rapid growth of cities and suburban areas has resulted in plants being surrounded within five years of the time they were built in areas purposely selected for their great distance from residences. In one instance, a plant is "offending" some 12,000 people, who, though not plant employees, have crowded into new residences built in the past several years on previously wide-open prairie.

Something can be done about it! The new concept of industry's right to freedom from harassment by residential neighbors, outlined in the June issue of AMERICAN FOUNDRYMAN (*"Industry and the Community: A Reciprocal Relationship"* by James R. Allan, chairman of the Steering Committee of the AFS Safety & Hygiene & Air Pollution Program, pp. 79-82), is now close to reality. International Harvester Co. has options on 537 acres of a 3,000-acre tract north of Springfield, Ohio. Moving its present Springfield plant to this area hinges, among other factors, on the 3,000 acres being zoned solely for industrial use. The Springfield Development Council is in accord with the proposed limitations. The city and environs may thus become pioneers in a new concept of zoning for industry.

Foundrymen already confronted, or likely to be, with complaints, ordinances, and injunctions can do no better than to participate in the Safety & Hygiene & Air Pollution Program. Those whose plants have not yet been surrounded by residential neighbors, and those planning new plants, might well consider the new concept of industrial zoning before being flooded with petitions and complaints from people who move into the area despite the fact that the foundry was there first.

Herbert F. Scobie

HERBERT F. SCOBIE
Technical Editor



Molten metal in the Allis-Chalmers La Crosse Works foundry is handled entirely by ladles suspended from a monorail system that serves the whole molding area. The transfer ladle filling the pouring ladle can traverse the entire length of the main gangway. The central rail down the gangway has bypasses near either end and a circuit at the midpoint which takes the transfer ladles under the cupola spout. Temperature losses are kept to a minimum with covered ladles and the single transfer. Each molder pours off his own floor using the bridge that serves his floor. Ladles are moved by hand.

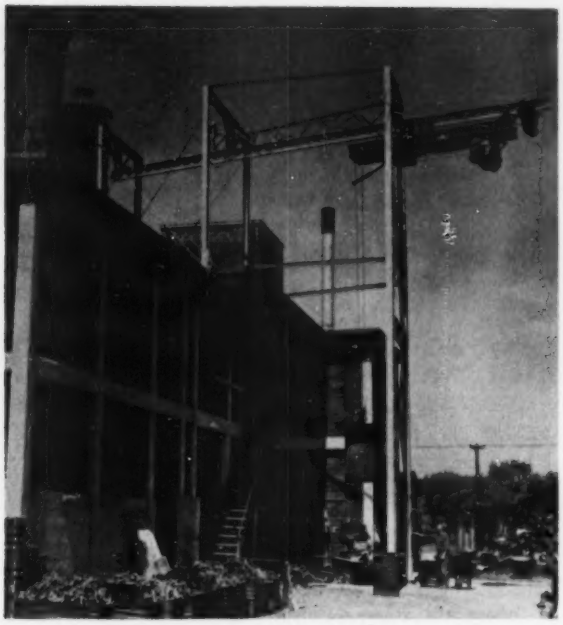
Precision Casting With Green Sand

■ Precision castings made in green sand molds represent the bulk of production of the foundry at the La Crosse (Wis.) Works of Allis-Chalmers Mfg. Co. One of the leaders among foundries attempting to save money by reducing—even eliminating—costly machining, the foundry produces inoculated gray iron and alloy iron castings for agricultural machinery. The castings range in weight from ½ oz to 50 lb and are expected to fit up as cast at many points normally machined to tolerances as close as ±0.008 in. On seed plates, flatness tolerances in a 7-in. diameter are as small as 0.015 in. Average weight of castings (750 different types) poured in 1952 was 1 lb 4 oz. Section thicknesses range from 1/16 to 4 in., are mostly 1/16 to ¼ in. In addition to precision, the shop features close control of grain size and metal composition, metal temperature, and sand.

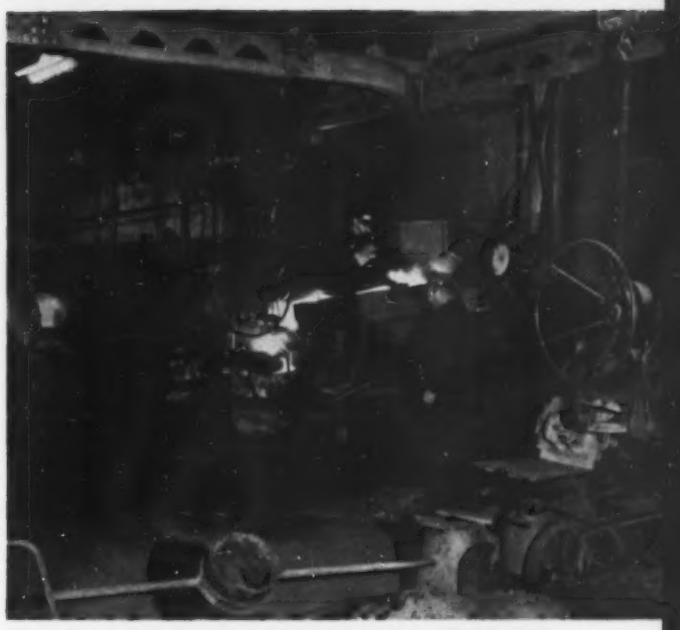
The foundry is 300 ft long and 80 ft wide plus separate rooms for lockers, materials storage, cupolas, maintenance department, and boiler and compressor room. Of brick and steel sash construction, the foundry has glass over two-thirds of the wall area. Housekeeping is excellent and roof fans change the air in the shop every 2½ minutes. Foundry employees, numbering 73, participate fully in the La Crosse Works health, safety, and recreation program which has helped give the Works a record of less than 10 doctor cases per 100,000 man-hours and no lost time accidents in 5½ years.

Directing operations of the La Crosse Works is Fred Papenfuss, works manager. Directly responsible for the foundry's excellent production, quality, and safety record are Edward R. Lund, foundry superintendent, and Fred Horak, metallurgist.

An expansion program increasing the size of the foundry by 30 per cent was recently completed. This gives the shop 25 production floors plus one experimental floor where experimental castings and repair



Unique cupola charger uses cone-bottom bucket which rests in pit at lowest position. When filled, the bucket goes to the top, moves horizontally into cupola, discharges, and returns to the pit. Electrical controls are at ground level.



The 42-in cupola is tapped directly into transfer ladles which are switched from the molding area sidetrack on to the main monorail line. Chill tests are taken on every tap. Periodically chills are sent to the laboratory for analysis.

parts for non-current agricultural equipment are produced. Molding equipment includes pin-lift jolt squeezers, cantilever head jolt-squeezers, a jolt-roll-over, and some portable swing-head jolt-squeeze machines.

Aluminum matchplate and cope and drag pattern equipment are used in 95 per cent of the work. Patterns are, of course, more precise than the castings they are expected to produce and are often "faked" a few thousandths to make the casting concentric, flat or accurate as required. The well-designed, close-tolerance patterns are all made in the Works pattern shop.

Quick-release, tapered flasks are used for 95 per cent of the molding to achieve speed and precision. Tight flasks are used on the plowshare floors.

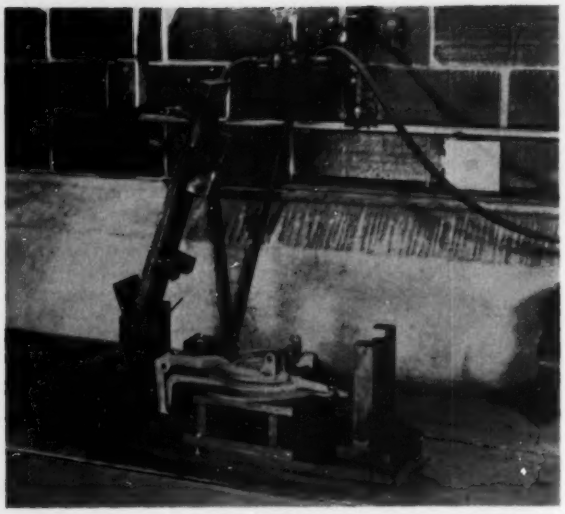
Natural molding sand from Tennessee is used. Three different grades are blended in proportions found appropriate for the surface finish desired. Western bentonite is added for heavier castings such as plowshares. New sand purchased has grain fineness of 85 (5-screen), 104 (3-screen), and 136 (2½ screen). Moisture is kept as low as possible, 2-3 per cent on lighter castings and seldom over 4 per cent on heavier castings. Moisture control is part of the key to good surface finish, Superintendent Lund says. Too-moist sand results in casting roughness and blows.

Sand is conditioned in place on each floor by the night crew. New sand is added as required, the heap is wet down, and mixed by a sandcutter. Moisture is checked often by means of a conductivity-type instrument. Although the rest of the molding department has a concrete floor, under each sand heap is a bed of clay 5 ft wide and 6 in. deep to help retain moisture. Only a few jobs require facing and in these cases a special mixture containing chemically-treated

Upper—In the cleaning room, castings are handled in skid boxes with power lift trucks. Stand grinders are centrally located for convenience in use and exhausting dust.

Lower—All plowshares are tested for fit to a plow frog before shipping to assembly department or to consumer.

Two airless blast cleaning machines process 75 per cent of the castings produced at the La Crosse Works. Some castings pass through ordinary tumblers as well. Sections of tire casings are used in both types of units to cushion the impact on thin castings to avoid breakage.



Fixtures with numerous gauging points insure that castings leaving the cleaning room will fit assemblies without machining. Foundry prides itself in eliminating costly machining operations, works closely with A-C design engineers.

wood floor is used to improve finish, speed cleaning, and eliminate rat tails.

The concrete floor is scraped, not swept. The light layer of sand remaining does not cause difficulty in walking and keeps the occasional light spills from splattering and damaging the floor. Floor traffic is not heavy enough to stir up excessive dust.

The Allis-Chalmers engineering department cooperates fully in designing castings that can be produced with good finish and fit. The project engineer discusses the casting design and its usage with the pattern shop foreman and the foundry superintendent before the casting is released for production. Every week a Casting Cost Analysis Committee meets to study casting cost reduction on castings made by Allis-Chalmers and those produced by outside foundries. This committee is formed by personnel from the Engineering, Inspection, Foundry and Purchasing Departments.

As a result of this committee's work, casting finish standards for the La Crosse foundry have been established and are specified on drawings as No. 1, No. 2, and No. 3. Smoothness is important for good fit in assembly and operation, and in painting, and castings can be rejected for failure to meet surface finish requirements.

Mold hardness, as well as grain size and moisture control, is a significant sand control factor and a tester is used to check molds which are expected to range between 50 and 60 hardness. Being established is a record system to keep on file all pertinent production details. A typical "job specification" card picked from the file showed the following: Metal Weight per Mold—9.28 lb; Quantity—28 pieces, two sprues; Flask—12 x 16 quick-release, 4½-in. cope, 3-in. drag; Cores—28; Riddle—No. 4; Jolt—four times; Sand Pile—medium; Moisture—to four per cent; Shift Allowed—up to 0.020 in.; Additions—6 oz Si-Mn-Zr alloy to 165-lb ladle; Finish—No. 2, airless blast and tumble.

To further keep rejects at a minimum, inspectors set them aside to be studied each day with the assistant

Cupolas are patched by air placement of a granular refractory mix. Refractory mixer is kept in materials storage room from which hoses run to the cupolas. Future development is second-floor storage of refractory material so mixer can be loaded by gravity.

Most cores at the La Crosse Works are blown on three blowers; some are made by hand. Core accuracy is comparable to mold accuracy to maintain precision.

foreman. The causes of all rejects are determined and recorded. Regular meetings of foundry supervision are held to discuss results.

The core room is a small, compact area with two blowers of about 3-lb capacity and a third for cores up to 20 lb. Some cores are made by hand. All core and facing sands are mixed in the same muller-type mixer. Core binders include corn flour and a fast-drying oil not sensitive to overbaking.

Core sand comes from a deposit along the Mississippi River, in sight of Superintendent Lund's office. Cores are baked in an oil-fired, recirculating, drawer-type oven.

Iron is melted in a 42-in. cupola equipped with air weight control and pressure gauge. Originally lined with cupola block, the lining is kept in shape by air placement of a refractory mixture. A combination of mechanical and hand charging is used, the cone-bottom bucket being loaded by wheelbarrow. The 1000-lb charges include 50-lb steel and approximately one-third each of pig, scrap, and returns. Fuel is by-product coke and averages 135 lb per charge. Flux in each charge consists of 35 lb of stone and 2 lb of proprietary flux.

Manganese and silicon briquets are charged as required and various ferro-alloys are added in the ladle to develop desired mechanical properties. Chill tests are taken for each tap of base iron and further chill specimens are cast when special ladle additions are made. Typical analysis of the base iron is: total carbon, 3.40-3.45 per cent; silicon, 2.28-2.25; manganese, 0.45-0.52; sulphur, 0.082-0.110; and phosphorous, 0.256.

Molten metal is distributed mechanically by means of a monorail and bridge system that serves the entire molding area. Six 1100-lb covered receiving ladles catch the iron from cupola and relay it to the floors where each molder has his own 165-lb pouring ladle.

Castings are shaken out on each floor by hand and deposited in skid boxes which are moved to the cleaning room by power lift trucks. The compact cleaning room has concrete machine mountings but a wood-block floor elsewhere to avoid breakage loss from dropped castings. All equipment is mounted far enough away from the wall to facilitate maintenance and housekeeping.

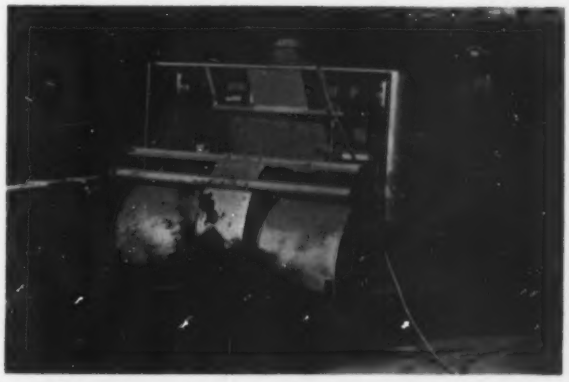
The four double-end stand grinders are centrally located for ease in exhausting grinding dust. An "inverted" swing-frame grinder with stationary wheel is available for larger castings. Three-fourths of the castings are processed in the two airless, blast cleaning machines. Four tumbling barrels are used in certain jobs and some castings are put through both the airless blast equipment and the tumblers.

The rigid inspection all La Crosse Works castings receive is given in the cleaning room where numerous fixtures check complex castings simultaneously at many points to insure concentricity, flatness, and dimensional accuracy. About 60 per cent of the castings are gauged. All plowshares are fitted to fixtures to make sure they will be easy to install in the shop and in the field.

A full-scale safety and hygiene program is in operation in the foundry. Nothing toxic or that can produce toxic, hazardous, or objectionable fumes is used

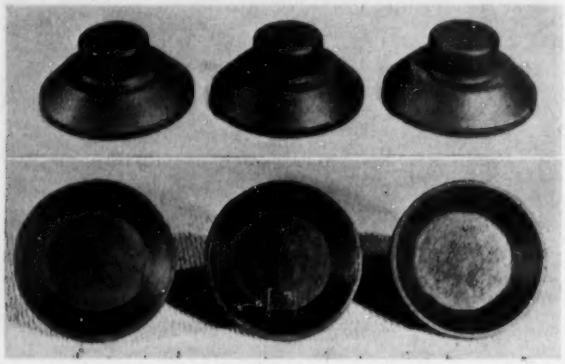
All molds, other than experimental, are made by machine on one of the plant's 25 production floors. Ninety-five per-cent of the flasks are the quick-release type which Foundry Superintendent Edward R. Lund prefers.

Plowshares are molded in especially-shaped tight flasks on two sets of jolt-squeeze cope and drag machines. The five sets of master patterns can be modified to give 18 different plowshare designs.



Sand is conditioned on each floor by the night gang. New sand additions are made as required. Moisture is added directly to the heaps which are mixed and windrowed by sandcutter during the operation.

Pouring ladles along the center gangway and well-filled molding floors indicate that the cupola is almost ready for tapping. Molders start at 7:00 am, cupola is lighted at 11 am. Molding stops and pouring starts at 1:30 pm. Each floor is served by a ladle except the two plowshare floors (not shown). Because of the relatively heavy castings, three ladles are used to keep the plowshare floors abreast of pour off in the remainder of the foundry.



Surface finish specimens illustrating (left to right) No. 1, No. 2, No. 3 finishes. Desired finish is designated on blueprints. Chief engineer, chief inspector, and foundry inspector of La Crosse Works all have set of standard castings.

in the shop. Periodic dust counts insure that dust content of the air is kept lower than the maximum allowable limit. Workers and visitors are furnished with and required to wear goggles.

Operations at the La Crosse foundry of Allis-Chalmers are built around a combination of modern and traditional methods with a liberal dose of ingenuity. For instance, instead of the traditional stick of wood for a soldier, this foundry uses a small rectangle of expanded metal. This makes a superior soldier which is readily recovered magnetically during sand conditioning.

A small casting with close dimensional tolerances was not passing concentricity tests due to non-uniform contraction of the center. The center was tied into the periphery of the casting by several spoke-like members that tended to pull the center to one side during cooling. Two thin fins added to the matchplate now tie the center to the periphery. Contraction is uniform and removal of the fins—easily broken out—leaves the casting concentric.

To line a 165-lb pouring ladle, the workmen insert a bottom tile in the shell, then center a cast alminum pattern shaped to the contour desired in the lining. A nearly-dry refractory mix is tightly rammed between the pattern and the shell by means of a bar. Top two inches of the lining are feathered out by hand. The smooth, dense lining is ⅝ to ¾ of an inch thick and lasts two to three months.

AFS Sponsors German Translation

American Foundrymen's Society has secured the exclusive North American rights for publication and distribution of the foreign language technical treatise, *"The Design of Die Castings,"* by Gustav Lieby, German metallurgical engineer.

In order to prepare the book for publication in the United States, it will soon be translated into English. Dr. Hubert Altwicker, consulting engineer of Dayton, Ohio, will do the actual translating. His work will be reviewed and edited by Dr. Charles E. Nelson, technical director, Magnesium Department, Dow Chemical Co., Midland, Mich.; Howard J. Rowe, chief metallurgist, Casting Div., Aluminum Co. of America, Pittsburgh, Pa.; and Hans J. Heine, Assistant AFS Technical director. It is hoped that the book can be published later in 1953.

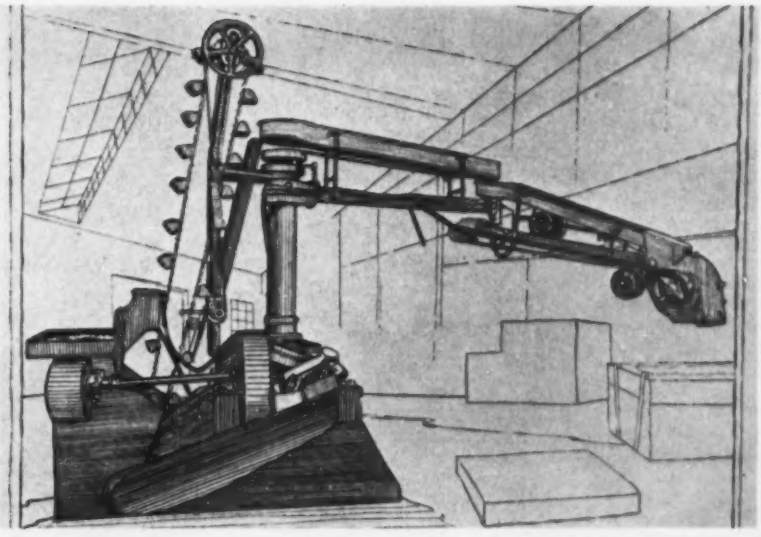


Fig. 1—Drawing of early sandslinger. Although crude by today's standards, it was basically similar in operation. After screening and tempering, sand was fed by chute into elevator which conveyed it to slinger. Head was manipulated by an operator.

Sandslinger Applications

MARTIN F. PUTZ / *Foundry Supt., Mattison Machine Works, Rockford, Ill.*

The story of the development and use of sandslinging equipment is part of a symposium on molding and coremaking presented at the 1952 and 1953 AFS conventions. The symposium papers will be combined in a special publication.

■ The story of ramming sand by throwing might well have started "once upon a time, long, long, ago" when a primitive molder discovered that by throwing sand into a mold his product was improved. This practice has been handed down from molder to apprentice to the present. The hand operation offers certain advantages but it is slow and expensive.

It was such an operation as this that caught the eye of E. O. Beardsley in 1914. As manager of the Klamath Falls Iron Works, Klamath Falls, Ore., he was concerned about the large quantity of castings they could sell and the slowness with which they were being produced.

The first recorded attempt at mechanical sand ramming by slinging depended on gravity. A trough, fashioned out of three wood planks, was suspended at an angle over the mold. Sand was fed into the mold through the trough from a wheelbarrow, also suspended. This crude arrangement did not ram the sand and the result was a failure.

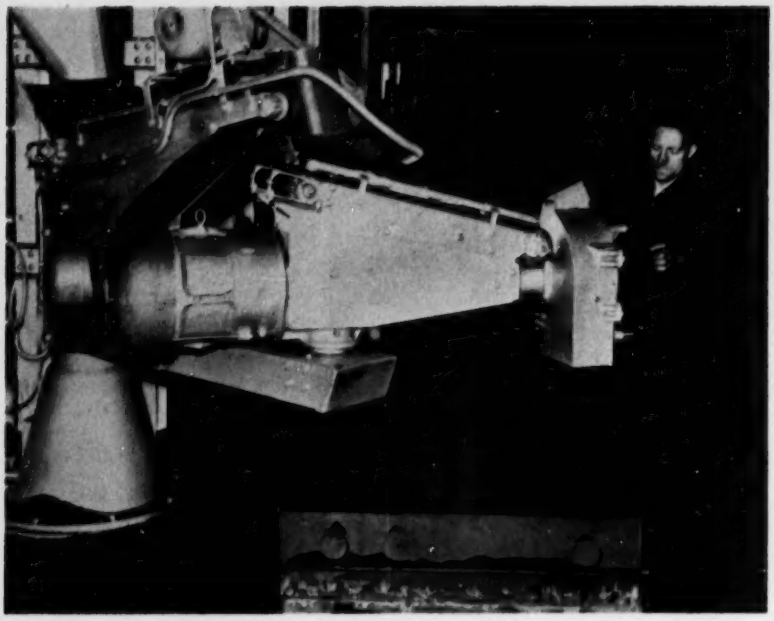
After consultation with his partner, W. F. Piper, it was decided that mechanical sand ramming by slinging would be practical. It was agreed that centrifugal force to propel the sand with necessary velocity was essential.

The partners worked on their idea and the result was a practical wooden ramming device which increased production with reduced effort. Additional machines were ordered and finally the inventors decided to manufacture slingers for foundry use.

Early Slingers Crude

The machine was redesigned and flaws which developed in actual operation were corrected or eliminated. Figure 1 is a picture of one of the very early slingers. Though basically the same, it is crude compared with the machines of today. After screening and tempering, the sand was shoveled into a chute which fed it into an elevator. The elevator in turn conveyed the sand to the slinger. The head was manipulated, by an operator, around the pattern and over the flask area until the mold was completely rammed.

The ramming unit imparts the ramming energy to the sand. It consists principally of an electrically driven impellor and sand feed belt whose speeds are synchronized. Sand is received in a hopper and con-



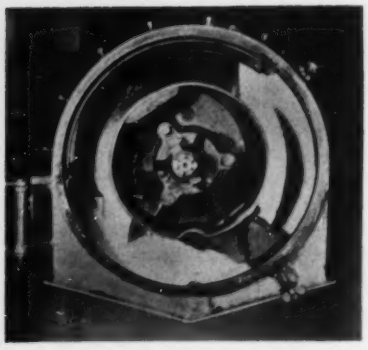


Fig. 2—(above) Stroboscopic view of impellor, showing sand leaving ramming head at lower left. Another wad is about to be caught and expelled.

Fig. 3—(left) Pattern and mold section are removed from ramming area after being rammed by slinger.

veyed by a narrow, fast-moving belt into the impellor head where it is picked up and thrown with predetermined force into the flask. For best operating and ramming results, the sand should be well-screened, properly mixed and fed at a uniform rate to the ramming head. Proper balancing of the unit permits the operator to maneuver it over the entire flask area with relative ease. Handles and push-buttons controlling the electrical equipment on the machine are located on the ramming head housing.

The impellor is fitted with a cup, blade or blades, which pick up a quantity of sand on each revolution. When picked up, the sand is formed into a wad and expelled straight down from the ramming head housing. Because of the speed of the impellor these wads are formed and discharged in what appears a continuous stream of sand. The stroboscopic view (Fig. 2) shows a wad of sand leaving the ramming head housing at the lower left and another wad ready to be caught and expelled.

Basically, the principles of hand ramming are applied when ramming a mold with a slinger. In each case, the lowest parts of the mold and the joint are rammed first. Then the flask is filled, maintaining an even level of sand until it is completely rammed. Since the sand is rammed into the mold a wad at a time, each wad of sand overlaps the preceding wad as the ramming head is moved over the flask area. It is the extent of this overlapping, together with the size and speed of the wad, that determines the hardness of the rammed sand. Properly operated, the slinger produces a mold of controlled hardness and density with complete uniformity throughout.

Job Shop Applications

A basic slinger jobbing setup would consist of any unit that could feed the prepared sand to the slinger at a controlled and uniform rate plus a stationary slinger. Ability to raise and lower the head may be a great advantage where considerable variation of flask height is experienced. In a jobbing operation, patterns and flasks are prepared for ramming away from the slinger. When preparation work is completed, the pattern and flask are moved, usually by overhead crane, to the ramming area under the slinger.

After being rammed by the slinger (Fig. 3), the pattern and mold section are removed from the ramming area to make way for another pattern and flask. Away from the busy ramming area the pattern in drawn and the other mold finishing operations are carried out.

Flexibility of the slinger enables it to ram molds of various sizes with little or no changes in pattern and flask equipment. Mold sizes up to 6 ft by 6 ft and 4 ft by 12 ft can be rammed by a machine of this type without difficulty. Pattern equipment can be either mounted or loose, metal or wood. Height of the mold is immaterial as long as the ramming head can be maneuvered freely over the flask area. Machines commonly used in job shops have a capacity of 600 lb to 1500 lb of sand per minute.

For Faster Ramming

Where faster ramming and greater sand capacities are required, it is no longer possible to operate the slinger manually because of the increased weight of the machine and the speed required to move the ramming head. Hydraulic operation of the slinger is then employed. All operations of this slinger are controlled by an operator from a seat mounted on the ramming unit. A joystick controls the movement of the ramming arms and enables the operator to move the ramming head over the mold.

Ramming capacity is increased to a peak of 2700 lb of sand per minute. The range of mold sizes that can be rammed is also increased. These can be as large as 8 ft by 8 ft or 6 ft by 16 ft. Smaller flasks

can be rammed without loss or slinger efficiency. This type of slinger is used in both jobbing and production molding operations.

A variation of the hydraulic slinger has a remote control station in the ramming area instead of on the ramming head itself. The station may be located at floor level or elevated for better visibility.

Stepping Up Output

To increase the mold output of a slinger operation in which a large variety of patterns and flasks are used, it is advantageous to employ additional equipment while still maintaining flexibility. This can be done by using a roller conveyor to move patterns and flasks to the various work stations and a rollover pattern draw machine to facilitate handling of mold sections and to obtain a better draw.

In a typical layout, patterns are prepared on a roller conveyor. From this point patterns and flasks are moved on a transfer car to the ramming area. After ramming, the mold is struck-off and moved to the rollover machine. A machine of suitable size to handle the molds being made rolls the mold sections and draws the pattern. The mold is moved to the finishing area and the pattern is returned by transfer car to the preparation area.

Loose Patterns

While this arrangement works effectively with mounted patterns up to approximately 48 in. by 48 in., it can also be used with loose patterns. The maximum size of mold that is practical on such a unit is not governed by the slinger but by the effort required to move it.

Figure 4 shows a typical slinger jobbing installation. Because of its flexibility, many different patterns can be rammed without loss of time. Pattern and flask equipment is set up on the closed section of the roller conveyor loop. After ramming and striking-off, the mold sections are pushed into a rollover pattern draw machine. Then the molds are moved to a finishing area and the pattern is returned to the set-up section.

Small molds can also be passed under a slinger on a roller conveyor without special set-up and rollover facilities to keep slinger operating time at a maximum.

Slinger Turntable Operation

A slinger turntable ramming operation (Fig. 5) permits flexibility in pattern changes and allows use of various flask sizes. The size of the molds to be rammed and the number of patterns to be used determines the size of the table and the number of stations. The rollover draw machine used should be capable of handling the molds to be rammed.

The turntable can be entirely above the floor. It should be equipped with roller conveyor sections at each station. Patterns and flasks are merely placed on these roller sections for ramming. The top of the roller conveyor on the turntable is set level with the rollers on the rollover draw machine which is installed adjacent to the turntable and opposite the slinger.

Patterns for this operations are preferrably mounted, but loose patterns can be handled. By having standard

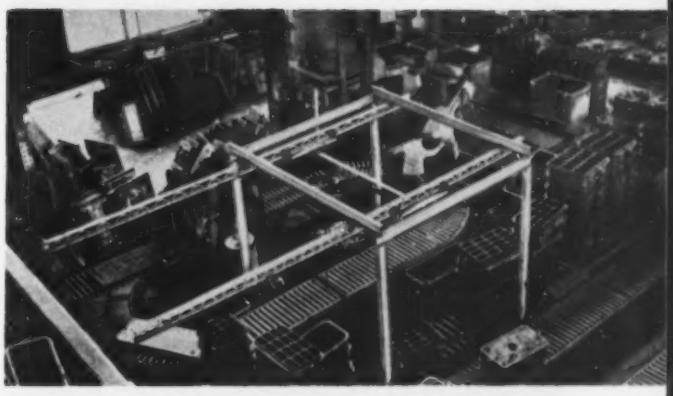


Fig. 4—Here is view of a typical slinger jobbing installation. Flexibility of the operation allows the ramming of many patterns without appreciable loss of time. The pattern and flask equipment are set up on the closed section of the roller conveyor loop.

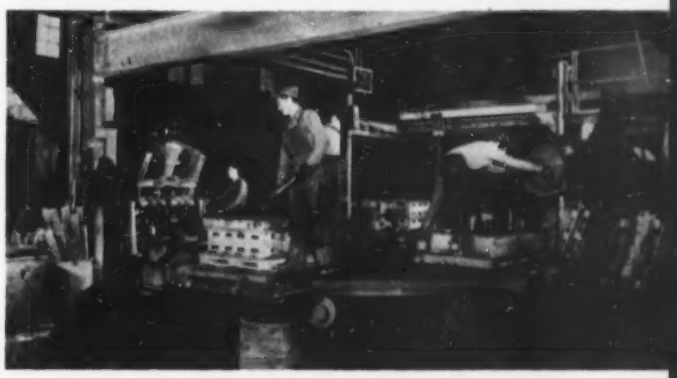


Fig. 5—The use of various sizes and types of flasks is possible through slinger turntable ramming operation, which also permits unusual flexibility in making pattern changes. Mold size and number of patterns determines table size and number of stations.

Fig. 6—Turntable installation with more stations can be used where smaller molds are in production. Cope and drag patterns are mounted on common pattern board in order to ram both at the same station. Height of flasks for cope and drag need not be the same for this operation. Mounting boards can be constructed so that both sections are rolled over and drawn together.

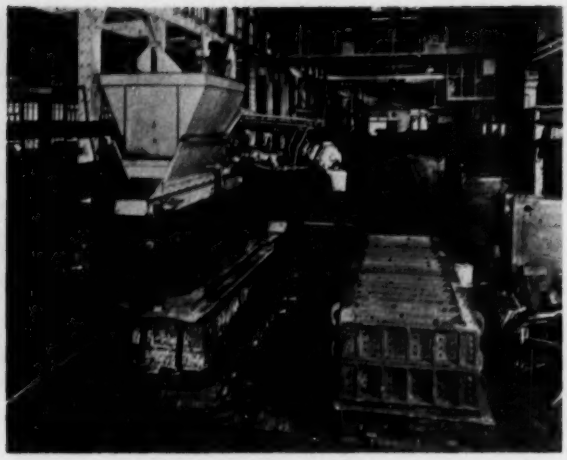


Fig. 7—Motive slingers are useful for large units, where variety and size of flasks do not allow easy movement to single ramming area. This machine is moved electrically on a track in its area. Molds can be rammed on both sides of the track.

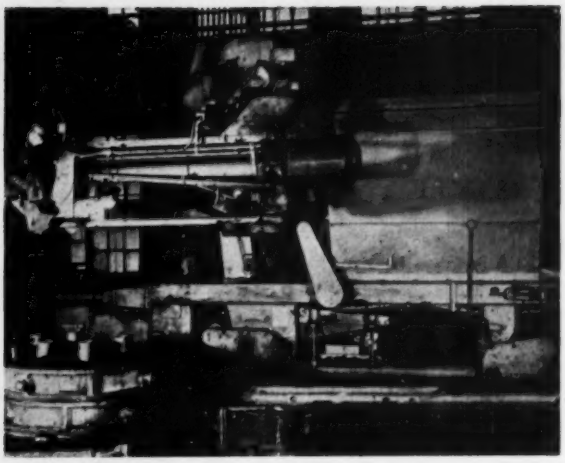


Fig. 8—Use of hydraulically-operated motive slinger for ramming medium-sized molds. Operator rides in seat mounted on ramming unit. All controls, electric and hydraulic, are mounted within convenient reach. Method is especially effective for larger molds

positions for fastening cleats to the pattern mounting boards, angle irons can be used to hold the pattern to the rollover machine table when the mold is in a draw position.

First the pattern and flask are placed on the roller conveyor section. The table is then indexed, moving the flask to the ramming position. Usually cope and drag are placed on alternate stations and as each is rammed the table is rotated. After striking-off, the mold section is indexed to the rollover machine, where it is rolled into the machine, rolled over, and the pattern is drawn. The mold is moved out of the machine onto a finishing conveyor and the pattern is returned to the table. At this point the pattern can be removed from the table or prepared for another mold.

On a turntable with four stations, molds up to 48 in. by 60 in. in size can be rammed. Such units are usually manned by three or four men and will produce at the rate of 20 to 30 complete molds per hour, and still permit pattern changes.

On smaller molds (Fig. 6), a turntable with more stations can be used. In this installation, cope and drag patterns are mounted on a common pattern board in order to ram both at the same station. The height of flasks for cope and drag need not be the same. Mounting boards can be constructed so that cope and drag sections are rolled over and drawn together. In a combined mounting operation similar to this, a variety of flasks sizes can be used, such as 20 in. by 20 in., 24 in. by 24 in., 24 in. by 28 in., etc.

Use Motive Slinger for Large Molds

Motive slinger operation is best suited to work relatively large in size and where variety and size of flasks used do not permit their easy movement to a single ramming area. The machine (Fig. 7) is moved electrically on a track in the area which it serves. Movement of the slinger arms is such that it can ram molds on both sides of this track. The width of the molds, approximately 12 ft, is determined by the length of the slinger arms. Length of the flasks is limited only by the length of the track.

Where greater capacity is required, maximum range of operation can be attained by the use of a hydraulically operative motive slinger. With this machine, not only the largest molds can be produced but a large number of medium-sized molds of great variety can also be rammed. In many instances, a motive operation is set up to ram large molds, up to 17 ft wide, on one side of the track. The space on the opposite side is used to ram molds on a roller conveyor unit such as has been described.

Motive Slinger and Hand Operations

Because of its ability to move from one mold to another, the motive slinger permits the molder to perform necessary hand operations where the complete ramming of the mold cannot be continuous. The ability of this machine to travel tends to relieve the crane load and also permit the effective use of additional cranes. It also provides for the ramming of unusually large flasks, pits, and extremely long patterns.

Figure 8 shows how medium-sized molds can be rammed with a hydraulically-operated motive slinger. It is especially effective for the ramming of large molds and pits since the operator rides in a seat mounted on the ramming unit. All the hydraulic and electric controls are mounted conveniently within his reach. The depth of the mold or pit has no measurable effect on the ability of the slinger to ram it.

For slinger production operation, patterns are generally metal and flasks are more uniform in size. Operations are repetitive and the quantity produced requires a minimum of pattern and flask changes. Designed for operations which are not served by auxiliary sand handling or conditioning equipment,

the self-propelled slinger travels under its own power on rack type tracks layed in the foundry floor. It is most suitable where production is required from a small variety of medium-sized patterns that may be mounted on pattern draw machines and pulled along behind it.

A spiral feeder conveys the prepared sand to an elevator which discharges it to a gyratory riddle before it goes to the ramming unit. A magnetic separator is frequently installed in the elevator housing to remove iron shot from the sand.

Figure 9 shows the approximate size of molds that can be rammed by a slinger of this type. As the molds are rammed and the slinger moves along the tracks, it vacates the floor space in which completed molds are placed for pouring. The usual size of mold produced in this manner would fall within a range of 20 in. by 30 in. to 36 in. by 48 in.

After pouring, the molds are shaken out on the floor in such a manner that the shake-out sand is windrowed between the slinger tracks. Then, after ramming all day, the machine is run through the shake-out sand heap, mixing the sand for the next day's operation. The area required for such an installation is approximately 30 ft wide and from 100 ft to 125 ft long. To determine the actual area for a given operation, it is essential to have complete flask and operational data.

Slinger Turntable Production Unit

Typical auxiliary equipment frequently used in conjunction with slingers includes a turntable, draw machines, and power conveyor. Usual procedure is to have cope and drag patterns mounted alternately on the pattern draw machines. After ramming, striking-off, and drawing, the molds are transferred to the power conveyor for core-setting and closing.

In many instances where maximum daily production is demanded it is desirable to use two turntables and two slingers to complete a single molding unit. One slinger produces all the drag sections and the other rams all the copes. Finishing and coring are done on the power conveyor between the drag and cope turntables.

Turntable Operation Using Stationary Slinger

Figure 10 shows how 16 stations permit the use of eight different patterns in a single operation. Cope and drag patterns are mounted alternately and after each is rammed it moves to the strike-off station. By standardizing on the overall height of the pattern draw machine and the mold, striking-off is accomplished automatically as the turntable rotates.

Mold sections are drawn by the machines, then transferred to the power conveyor for coring and closing. The same men who close the molds strip the slip type flasks from the mold placing the drag flask on the turntable and the cope flask on the proper pattern. Another team cleans the patterns and sets the drag flask.

Units of this type, making molds from 24 in. by 24 in. to 24 in. by 48 in. and up to 24 in. deep, are capable of producing from 70 to 80 molds per hour, in foundry operations.

By using somewhat different equipment in a layout suited to the type of work produced and the area available, two remote-control, hydraulically-operated slingers provide the ramming capacity in the unit shown in Fig. 11. The operator's control station is located in an elevated position providing good visibility. An indexing mechanism which moves the flask and pattern into proper ramming position is used in both the drag and cope ramming areas. Two cope and drag patterns are used. While one is being rammed, the other is being drawn and removed from the machine.

Drag sections are placed on a power conveyor for coring. As they move past the cope ramming area, the molds are closed and clamped preparatory to being poured. The mold output from a unit of this type will vary widely, depending primarily on the size of molds being produced.

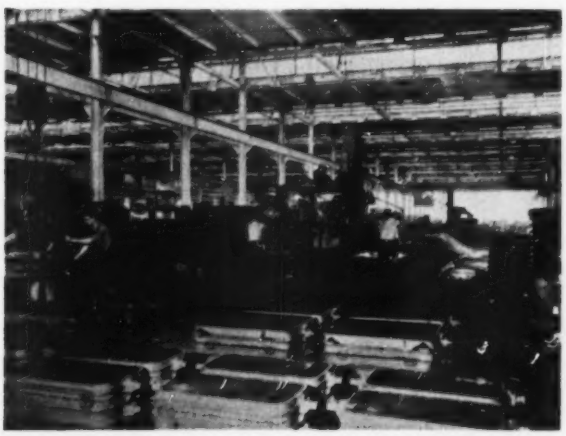


Fig. 9—Photo shows approximate size of molds that can be rammed with slinger. Slinger vacates area in which completed molds are placed for pouring. Mold sizes range from 20 in. x 30 in. to 36 in. x 48 in.

Fig. 10—This view shows how 16 stations allow use of eight different patterns in single operation. Cope and drag patterns are alternately mounted and move off to strike-off station after each has been rammed.

Fig. 11—(above) This unit incorporates two remotely-controlled, hydraulically-operated slingers and uses two cope and drag patterns. One is being drawn and removed from machine while other is being rammed.

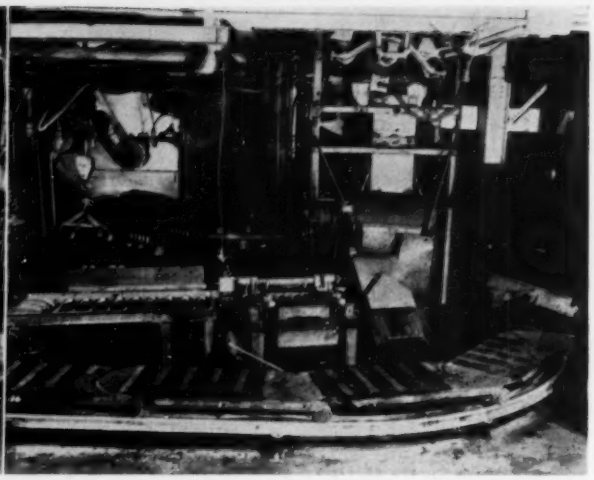


Fig. 12—Automatic slinger ramming is possible where high production is required and complete standardization is practicable. Shallow mold castings, such as these camshafts, are suited to this type of handling.

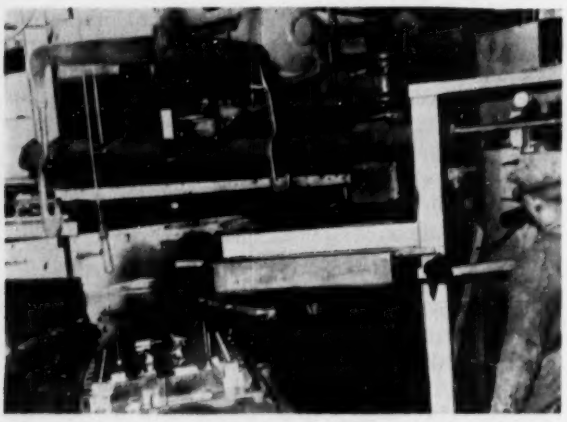


Fig. 13—Complete flask standardization is essential for automatic ramming. Use of turntable and pattern draw machines is desirable to complete molding unit of the type illustrated above.

Production slinger ramming operations which use a single pattern for long periods of time and in which the flask size remains the same throughout often make use of an automatic slinger. The ramming head of this slinger is mounted directly on the ramming motor. Sand is fed into the ramming head by gravity. The entire unit is suspended in a cradle mounting which permits free movement of the ramming head in any direction necessary. A rotary motion is imparted to the ramming head by an automatic drive mechanism. This type of slinger is used effectively on molds approximately 18 in. by 36 in. by 6 in. deep. Wider flasks can be rammed by using a dual unit.

Where complete standardization is possible and production requirements are very high, automatic slinger ramming becomes practical. Castings which can be made in shallow molds (the camshaft illustrated in Fig. 12 is a good example) are well suited for this type of production. Here the molds are made on an 8-station turntable producing both cope and drag sections. They are rammed, struck off, and drawn automatically. In addition, the drags are picked off the draw machines and rolled over automatically. The copes are removed from the draw machines manually for closing. Operations of this type regularly produce in excess of 200 molds per hour.

Automatic Hydraulic Operation

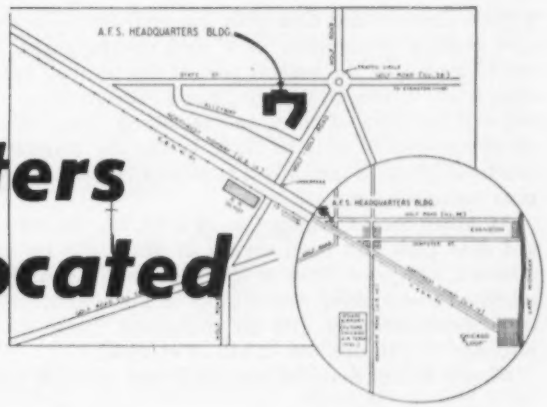
Automatic slinger ramming is not limited to small molds. Larger flasks can also be rammed automatically by a slinger designed for that purpose. In production molding, flasks and patterns are brought into position automatically and the molds are rammed without an operator. An electrically-driven cam controls the movement of the ramming arms over the flask area until the mold is completely rammed.

Each new ramming cycle is established by placing the flask and pattern in the ramming area. It is extremely important that the pattern be positioned precisely to get exact duplication of ram from automatic control. An operator manually establishes the ramming cycle which is scribed onto a disc. The disc is then cut to form the cam which will thereafter direct the entire ramming operation without an operator. Although smaller flasks can be rammed, molds up to about 5 ft by 5 ft in size can be produced by the automatic slinger method.

Since it is essential to have complete flask standardization for automatic ramming, it is used in production operations. See Fig. 13. To complete a molding unit of this type the use of a turntable and pattern draw machines is desirable. Patterns and flasks are automatically indexed into exact ramming position by the turntable. Because all flasks are of the same height striking off is also done automatically.

After mold sections are drawn by the machines, they are transferred to a power conveyor for coring and closing. Production output from units of this kind, making two automobile engine blocks in a mold, is approximately 70 to 80 molds per hour.

Site of new AFS headquarters building, July, 1953. Underpass for U.S. highway 14 shown at extreme left.



AFS Headquarters Conveniently Located

Three new contributions to the American Foundrymen's Society Building Fund have recently been received. They are from Eaton Manufacturing Co., Detroit; Albion Malleable Iron Co., Albion, Mich.; and Sterling Foundry Co., Wellington, Ohio.

Plans are rapidly progressing for the actual groundbreaking ceremonies at the new headquarters building site of AFS. The program, as we go to press, calls for excavation to begin approximately September 1, with actual construction to follow shortly thereafter.

The site, shown in the map on this page, is conveniently located in the Chicagoland area. It is just 26 miles from the Loop on the Chicago and Northwestern railway, which operates a suburban station just across the highway for commuter stops. The lot is just north of U.S. highway 14, a 4-lane express road from Chicago to the northwest.

Des Plaines, location of the new headquarters, is a rapidly growing industrial-residential community of 21,000 population. The city was founded early in the 19th century by the French and was slowly assimilated into the Chicago orbit as the metropolis flourished on the lake shore. With a 1940 population of about 9,000, Des Plaines has prospered since World War II, and is now growing at the rate of three families per day.

The city has been a center for light industry for several years and, appropriately enough, one of the first industrial establishments was a foundry, which has now become one of the most modern in its field.

Incorporated in 1837

Incorporated as a village in 1837, Des Plaines is now a city with a mayor and a city council of 14 aldermen. It has excellent schools, fire and police departments, and other municipal services. A church seminary is soon to be built within a half-mile of the new AFS site, which is itself on the fringes of one of the finest residential developments in the area. The headquarters will enjoy many advantages in its new location in this progressive northwest suburb of Chicago.

Use of Self-Developing Camera To Set Core-Making Standards

FRANK C. ADAMS and ROBERT S. FOERSTER / *John A. Patton Management Engrs., Inc., Chicago*

Setting rates by means of standard data requires precise, complete knowledge of all elements of work involved in performing each job. A self-developing camera was used by the authors to record necessary core details.

■ Once the standard data plan has been set up in the core making department of a steel casting plant, it would seem that the biggest part of the job had been completed. However, securing exact measurements of the various types of cores and recording those measurements—which must be done before the standards can be applied—is not only a vital part of the job, but time consuming as well.

At Allied Steel Castings Co., Harvey, Ill., the standard data plan had been set up in May 1953 by the author's company from a series of detailed studies taken on core making over a range of green sand cores of all types, running into the thousands. These cores not only vary in size, but in bill of material.

After a bill of material was made out for each type of core, the time-consuming part of the job followed—each type of core had to be measured and the measurements recorded. Usual procedure is to sketch the types of cores and to indicate the measurements on the sketches. This system is satisfactory, except that few time study engineers are able to make a sketch that shows all the details of construction accurately.

Camera Speeds Job

Photographs could speed up the operation and at first ordinary cameras were used. While this was found to be better than sketches, the time lag of at least 24 hours between taking the picture and securing the finished prints was objectionable. Next we tried a type of camera especially suited to speeding up the job, a camera that takes a picture and develops it in approximately one minute's time. Furthermore, it is particularly suited to jobs requiring but one picture, since only one print can be made.

The procedure at Allied Steel was to set up a completed baked core on a table which had been covered

Time study engineer making photograph of core with coremaker looking on. Method eliminates necessity for rough sketches on which to indicate measurements. Photo insures accuracy of details.

with white paper to provide a contrasting background. This background was necessary, since the cores were made of various combinations of black, red, or yellow sand, and would not reproduce well in a photograph unless a strong contrasting background were used. The light background also served another purpose—it provided a light area on all sides of the core so that a black grease pencil could be used to draw dimension lines on the glazed surface of the finished print.

Use of Lights

The photo can be made without the use of a flash gun, particularly if a tripod is used to steady the camera. Otherwise, photoflash or flood lights are indicated. It was also found that if the core could be photographed from an angle, it would provide a good isometric view.

Before the photo was made, certain core finishing details could be highlighted on the baked core by outlining them in yellow crayon. These details included such matters as flathead nails, exposed iron chills or patent chills. In addition, the identifying core number and box number could be printed on the surface of the baked core with yellow crayon. If the core was made primarily of yellow silica sand, a black crayon was used for better reproduction in the photo.

Any camera with a moderately good lens and shutter may be used, but the self-developing type is preferred because it is such a big time saver. For example, this type of camera delivers a positive print approximately one minute after exposure. During this interval, the engineer is able to start measuring the core on the table. After about five minutes—or, even less—for the positive print to dry, he can transcribe these measurements directly onto the face of the print. Thus, in approximately six minutes, the whole operation is completed.

Photo Part of Materials Record

After it was completed and the measurements transcribed directly upon it, the print was taken to the office and attached to the top of the bill of materials sheet. Space for the necessary computation is provided on the lower part of the sheet. As the bill of material data are listed directly under the photograph a single sheet thus contains all the information the engineer needs to apply the increment specification standards.

This part of the job can be further speeded up, if necessary, for the engineer who applies the standard need not be the man who takes the picture or measures the core. Any engineer, trained in the application of standard data, can apply the standards from the photo with its measurements—he need not see the actual core, since he has the photo. Thus two or more men may work on the job at the same time. Unlike a sketch, the photo omits no detail. In sketches, some one detail may be omitted or distorted and thus mislead the engineer applying the standards.

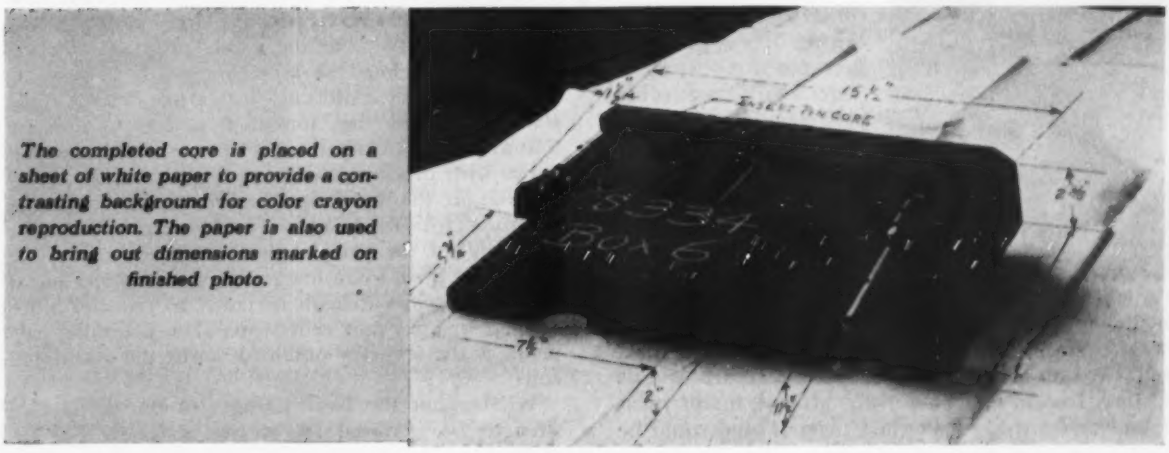
Simple Operation

In the preparation of these photos, it is not necessary to try for pictures which are photographically perfect. If the exposure is sufficient to show the details of the core, further improvement in photographic technique is superfluous. The operation of the camera is so simple that little time is required to train company engineers in operating it—another factor in favor of this method of reproducing details of cores or castings. Cost-wise, the film (a roll of eight pictures) can be secured at retail at $1.75 a roll; flash bulbs retail for $1.05 per sleeve of eight bulbs. Purchases in quantity would, of course, cut costs considerably, varying with the local situation.

Applications

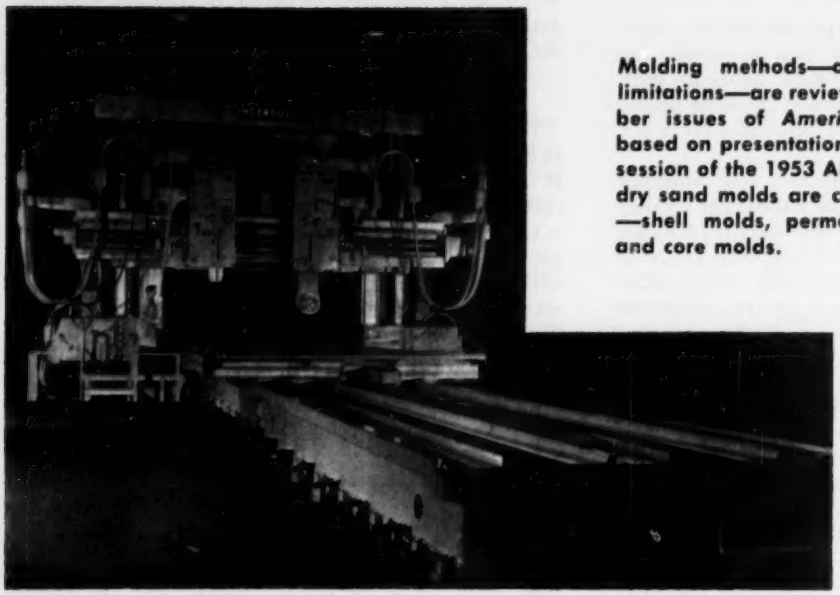
Allied Steel management at once foresaw further application of this technique to other foundry operations, such as floor molding and finishing of the castings. Thus, while the job was started with the Patton Management Engineers' camera, Allied soon purchased its own camera to take advantage of this technique on other operations.

The self-developing camera provides only a single positive print, but that is all that is required for this type of application. Emphasis was put primarily upon expediting the time required to place a core-making operation "on standard"; to recreate an image of the core in accurate detail; to be able to retain an accurate record of each core placed on standard for future reference in case of changes in detail or method.



The completed core is placed on a sheet of white paper to provide a contrasting background for color crayon reproduction. The paper is also used to bring out dimensions marked on finished photo.

Evaluating Moulding Methods



Molding methods—applications, advantages, and limitations—are reviewed in the September and October issues of *American Foundryman*. Papers are based on presentations made at a Sand Shop Course session of the 1953 AFS Convention. Green sand and dry sand molds are covered this month; next month —shell molds, permanent molds and die casting, and core molds.

Fig. 1—Thirteen castings on this 120-ft planer weigh over 20 tons. The heads weigh 4-8 tons. All were cast in dry sand.

What Is Precision Casting?

HIRAM BROWN / *Chief Metallurgist*
Solar Aircraft Co., Des Moines

■ As far back as any of us can remember, we have heard the term "precision casting" applied to some form of casting. It was probably first coined thousands of years ago when some man found that he could cast good replicas from a shape carved in stone rather than by pouring metal into a hole in the ground. It was probably revived when the Chinese found they could cast rings onto bronze pots by use of the lost wax process.

Of course, few of us can remember that far back, but we can recall the modern counterpart of this history. Instead of a hole in the ground, foundrymen found that a shape made in a mass of sand could be easily and cheaply used to cast metal parts. Then someone found that shapes carved into metal molds offered certain advantages. The use of the word "precision" began to become common in comparing those permanent mold castings with sand castings.

After that, die castings usurped the role of "precision" casting. Then came plaster and investment "precision" casting, and now we have shell molding as the newest member of this family. In each case as the new process made its appearance it was accompanied by a colorful promotion program inevitably accompanied by some overselling. Eventually each type of casting settled into its proper place.

Let us see first what the word "precision" means. Precision is defined as accuracy, which in turn is defined as "exact conformity with truth *or with some standard.*" These last four words seem to indicate that precision is a relative word whose actual meaning varies with the standards used to judge it.

What are the factors involved in selecting a casting or process for producing it? First, is extreme accuracy necessary for the part involved? Will the casting be machined? If so, will a few thousandths more of metal actually be more difficult or costly to remove? Since any "precision" part will demand a premium payment, is the accuracy obtained worth the additional cost?

What about the basic strength of the parts? Can strength be sacrificed for greater accuracy? For ex-

Fig. 2—Housing castings for Massey-Harris combine made in green sand in company's "M" Foundry.

Fig. 3—Tractor transmission case and gear housing used in manure spreader are green sand castings.

ample, permanent mold and die castings will be stronger than shell molded castings of similar design and section size. Generally, sand castings will be stronger and more sound than investment castings.

What about size? There are definite limitations to the size of parts which can be produced by the various processes. At present, sand casting is the only process which is practically unlimited in size of parts produced.

How about shapes? Cored holes? Undercuts? These may limit the process which can be used or the tolerances obtainable.

Finally, what are the latest advances in techniques in the various fields of casting? Don't sell sand castings short as precision parts. Foundries now extensively make use of dry sand molds, skin dried molds, and new high strength green sands. Don't forget also that a number of small parts can be rapidly and accurately produced in sand foundries by use of a matchplate pattern, whereas those parts could be made only singly or a few at a time by some of the other processes.

Examine all the methods. Check all the factors. Isn't precision relative? Then why not have precision sand castings as well as precision investment castings? Designers and foundrymen might well avoid the phrase "precision casting" unless it is accompanied by the name of the casting process.

A review of a number of casting methods should help foundrymen and castings users to understand each process a little better so that the best results possible can be obtained from each of them.

Green Sand Is Versatile

C. E. Maddick / *Works Manager*
Massey Harris "M" Foundry, Brantford, Ont.

■ Green sand molding is the process of producing castings in molds of either natural or synthetic sands in which the essential bonding agent is clay or bentonite. Certain other ingredients such as wood flour, sea coal, cereal, etc., may be used to impart definite properties to the green sand mixture and mold. The metal is cast directly into the molds after they are made, with no other operation or process such as skin-drying or baking, being involved.

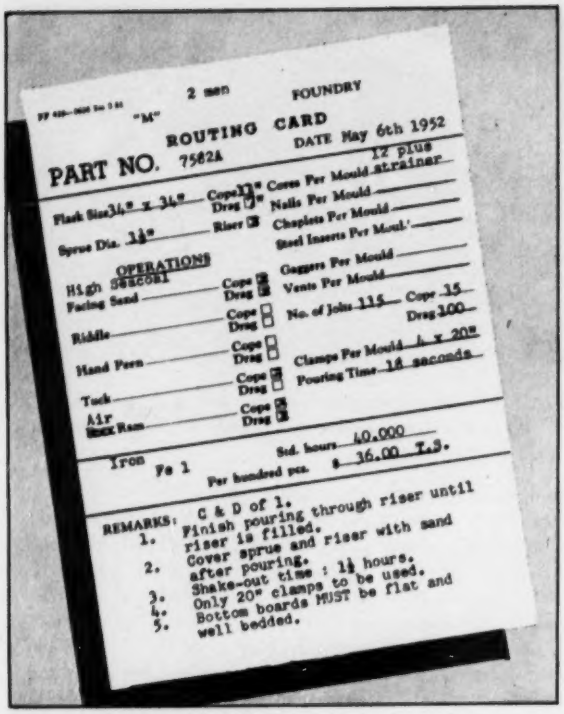
The vast majority of foundries in the United States and Canada use the green sand molding process and by far the largest proportion of all castings is produced in green sand molds. Economy, versatility, and rapid production are characteristic of green sand molding.

No materials suitable for molding purposes are as inexpensive in their initial and prepared costs as the sand, clay, and other ingredients used in green sand molding. The cost of all the materials delivered to the molder's hopper, ready for use, will approximate 2-3¢ per 100 lb—enough for a mold 12x16x9 in. deep. However, the cost of the materials is not the only outstanding economy of the process. The author believes it can be shown that all factors considered, final costs of the casting out the shipping room door is considerably less for this process than for any other molding method.

Adaptation to a great variety of conditions and types of castings is most easily done in green sand molding. Should only a limited quantity of a certain casting be required, all that is needed is the original master wood pattern, the flask, the proper sand, and a good molder.

Where larger quantities of a casting are required, more elaborate pattern equipment can be provided. This starts with a gate of patterns, then to a frame and match part, then to a match plate, and on to cope and drag equipment if the production warrants the expenditure.

Rapid production possible with green sand molding



2 men FOUNDRY

"M"

ROUTING CARD

PART NO. 7582A DATE May 6th 1952

Flask Size 34" x 34" Cope 11" Drag 7" Cores Per Mould 12 plus strainer

Sprue Dia. 1½" Riser ☒ Nails Per Mould

Chaplets Per Mould

Steel Inserts Per Mould

OPERATIONS

High Speed Facing Sand Cope ☒ Drag ☒ Gaggers Per Mould

Vents Per Mould

Riddle Cope ☐ Drag ☐ No. of Jobs 115 Cope 15 Drag 100

Hand Peen Cope ☐ Drag ☐ Clamps Per Mould 4 x 20"

Tuck Cope ☒ Drag ☐ Pouring Time 14 seconds

Air Back Ram Cope ☒ Drag ☒

Iron Fe 1 Std. hours 40.000

Per hundred pcs. $ 36.00 T.S.

REMARKS:
1. C & D of 1. Finish pouring through riser until riser is filled.
2. Cover sprue and riser with sand after pouring.
3. Shake-out time : 1½ hours.
4. Only 20" clamps to be used.
5. Bottom boards MUST be flat and well bedded.

Fig. 4—Routing card covers production details to be followed in producing specific casting.

is illustrated by the fact that an individual molder can produce from 200 to 400 matchplate molds per day. Thus, the total man-hours per casting is relatively low compared to any other molding procedure.

Versatility Can Be Pitfall

The very fact that green sand is so versatile can be one of its greatest liabilities. It is possible to take any one of a million combinations of sand–clay–water–additives, mix them carelessly . . . hammer the mixture around a pattern . . . remove the pattern . . . then pour metal into the resulting mold cavity. *Something* resembling the casting desired will be produced The result depends on a number of things: standards of acceptance, knowledge of the process, and–most important–whether the one producing the casting is a real foundryman, intensely proud of his trade, or whether he is just putting in time at the job.

While it is possible to get a casting from most any mixture of green sand it is not true that just any sand is satisfactory. To be successful in using green sand molding, it is necessary to establish and use sand control methods. This must be done or the foundryman will waste time, effort, and money. Even the smallest shop having one or two molders should at least make regular daily checks on the moisture content of the sand. In addition, there should be regular tests for permeability and green compressive strength. Their investment will be returned many times over.

A good working knowledge of green sand properties and their control is easy to obtain. No mysteries are attached to it; all that is required is a little perseverance and the reading of a few of the excellent books

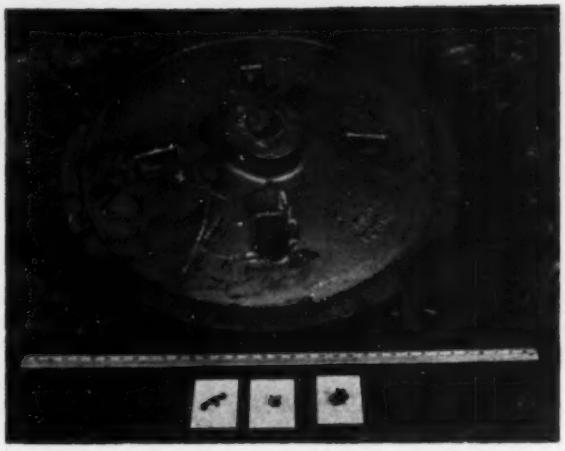


Fig. 5—Wheel center weighing 715 lb requires close sand and ramming control to avoid scabbing.

and papers on the subject. Three of the best, but by no means the only good sources of information are: *Foundry Sand Handbook, Foundry Sand Control,* and *Foundry Sand Practice,* published, respectively, by AFS, Great Lakes Foundry Sand Co., and American Colloid Co.

The knowledge obtained will be used many times in the elimination of casting defects and the consequent headaches resulting from trying to cure the disease without using the best medicine–sand control.

From the basic controls such as moisture, permeability, and green compression, it is a short step to mold hardness, grain distribution, loss on ignition, hot strength and dry strength. In addition to making tests, it is essential to maintain an adequate record of the best sand for a particular casting and then follow up and see that this sand is used, and in the same way every time. This means rammed to the same mold hardness.

Applied Sand Control

Here is an example of green sand control based on experience with the largest casting made in our foundry. A wheel center for a tractor, it is 31 in. in diameter and is 4 in. thick with a center hub section 9 in. thick. The casting weighs 715 lb and it must have an extremely smooth surface. No shrinkage or other internal defects are permitted and the castings are x-rayed. A wheel center is shown in Fig. 5.

Until starting to make this casting, we had been producing regularly castings weighing from a few ounces up to just under 200 lb. We had established fairly good sand control and the finish on our castings was generally pretty fair. Now we would have to produce approximately 100 of these castings per day and would have to produce them at a competitive price. Logically, since we wanted the lowest cost and a relatively high rate of production and with no physical changes to our plant, the obvious choice of molding process was green sand. We realized, however, that we might experience problems in scabbing on the surface and also that a

casting as heavy as this might vary widely in overall weight.

Our fears were justified. We got many surface scabs resulting in expensive rectification or costly scrap, and also found quite a wide variation in casting weight. We got to work immediately and before too long had most of the answers to our problem. We found what is probably known to all but is often forgotten—a specific sand mixture will produce entirely different results depending on the degree to which it is rammed. This is not too serious on many castings but where you have a large uninterrupted cope surface, expansion defects become a problem and then it is necessary to work out the most desirable mold hardness for the sand mixture.

On this particular job, we had to start with a certain mold hardness and had to hold that hardness to control casting weight variations. This, meant we had to develop a sand mixture that would yield the desired results in terms of surface finish at a predetermined mold hardness. Pouring time and temperature had to be held within fairly close limits. Once the metal entered, the mold there would be a terrific heat radiation from the metal in the bottom of the mold onto the cope face. This could cause drying out of the surface resulting in washes, sand inclusion, drops, scabs, buckles etc. To avoid this we developed a gate that would fill the mold completely in 18 seconds. Tying in all these related controls enabled us to make almost 20,000 of these castings with a scrap loss from all causes of less than one per cent.

A routing or operational card, kept up to date at all times, is always delivered along with the pattern to the molding floor. It is the responsibility of the supervisor and the molder and pourers to read and know the methods to be used in making the particular job. No deviations are permitted. No job is ever run without first having a definite method established for it. Figure 4 shows a typical routing card.

Dry Sand For Heavy Work

GEORGE W. ANSELMAN / *Consultant*
Formerly Fdry. Supt., Beloit Foundry Co.

■ To understand why some foundrymen go to the trouble of drying the sand instead of using it green as molded, consider a large die shoe (Fig. 8) for stamping out truck frames for the automobile industry. This shoe was made of ductile iron and took 18 tons of metal to pour the casting. Weight ready for shipment was approximately 14 tons. This casting is 18 ft long, 5 ft wide, with a metal thickness of 6 in. on the flat surface and 5 in. on the sides with about 1½-in. ribbing. This casting was bowed ¾ in. in the original mold so that in cooling it would draw back to allow for ½ in. machining stock all over. Pouring time was one minute and fifteen seconds; base side was toward the cope.

This is what some foundrymen making small work refer to as "all in the drag, lots of draft, and no headaches."

The reasons for putting this casting in a dry sand mold are: (1) size, (2) high dry strength prevents the sand from washing, and (3) to give the mold strength to withstand the terrific pressure of molten metal poured at the rate that was necessary so that the sand would not break down or begin to collapse before there was pressure on all surfaces.

This particular type of casting would be difficult to make successfully with green sand because the volume of metal would break down the surface of the mold and start an erosion scab before the sand could develop sufficient dry and hot strength around the gate area. The casting was made in a pit mold to gain maximum strength in molding flask equipment.

Figure 9 shows a counterweight casting with the following dimensions: length, 80 in.; width, 61 in.; thickness, 34 in. This job was pit molded rather than flask molded in order to get maximum strength in flask equipment. The small hole, 4 in. in diameter, was made with an oil sand core mixture. The slotted section of the casting was made with the same core

Fig. 6—Tractor housings are green sand castings.

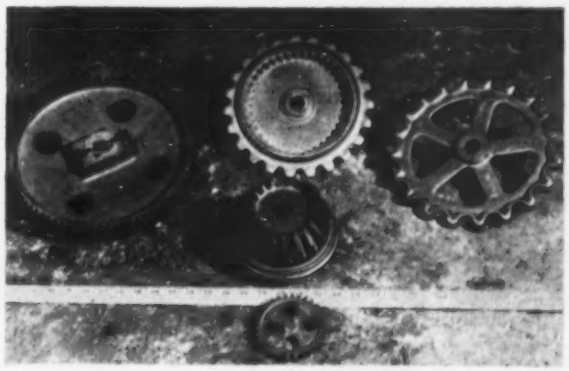


Fig. 7—Yardstick indicates size of sprockets and gears cast in green sand by Massey-Harris.

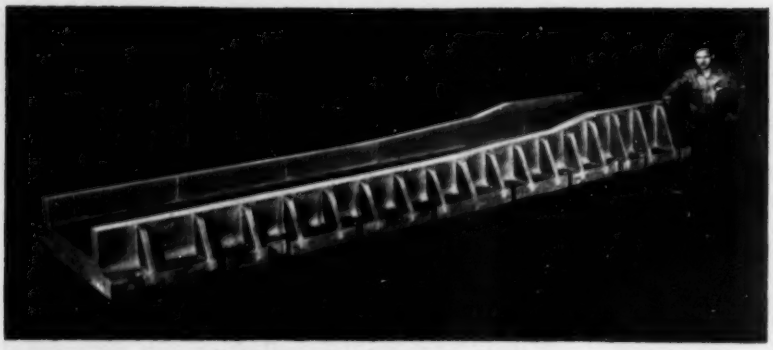


Fig. 8—Large die shoe (finished weight 14 tons) was cast in dry sand. Pouring time was 75 seconds.

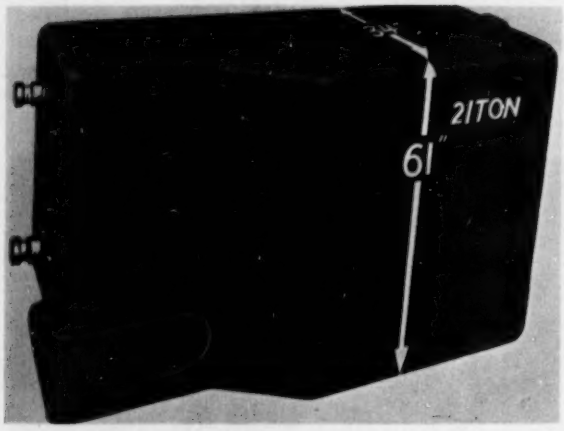


Fig. 9—Counterweight casting was made in dry sand in pit. Slot at left and 4-in. diameter hole were cored with an oil sand mixture.

mixture. Four trunnions were cast on the casting to faciliate handling in the foundry and in the machine shop. This casting was poured in two minutes and thirty seconds. Poured at the beginning of the heat, the mold touched up with some of the last metal out of the cupola five hours later.

To properly feed this casting an exothermic riser compound was used to keep the feeding head open. For the last three-quarters of an hour, to the risers were pumped to prevent them from solidifying before the casting.

Dry Sand Aids Core Fitting

The counterweight was used as a balance for the large cross rail and heads shown on the machine in Fig. 1. This machine has a total bed length of 120 ft, plus an oil pan on each end. Thirteen castings in this machine weigh over 20 tons and all were made in dry sand molds. The heads, weighing 4 to 8 tons, also were cast in dry sand molds using flask equipment. In this case, dry sand molds were used not because of the large volume of metal, but because of the complicated coring. Pattern equipment for such castings is made most generally on a one-time basis and lacks the accuracy needed to set cores without fitting. This means trying in and out of molds several times.

Dry sand molding is used in many places where there are a large number of cores that have to be rubbed and fit to the mold. The 4-ton head could be made in green sand if it were not for the complicated molding and coring. Beloit Foundry Co. produces a grinder base, at the rate of one a day in a skin dried mold. The patterns and cores are made to exact dimensions. This casting is approximately 2 ft wide, 2½ ft deep, and 12 ft long. Way sections are cast in the drag and the skin dried sand comes in contact with the mold on the sides and cope, the way sections being made out of oil sand cores.

In contrast to the heavy, dry sand work, Beloit Foundry makes some castings with green sand. These are made on squeezers, rollovers, and also with loose patterns. The only difference between the sand used to make the small castings and the large ones is that sea coal is used in the green sand work, and pitch compound in the heavy dry sand work. The cores are made out of the same base grain.

Stazinski Authors Exchange Paper

Announcement has recently been made of the selection of Joseph B. Stazinski, General Electric Co., Lynn, Mass., to prepare the exchange paper to be delivered at the 1953 convention of the Institute of Australian Foundrymen, New South Wales Division.

The paper will be presented during the Australian society's meeting, scheduled for September 1-3, 1953. Shell molding will be the general subject of the exchange paper, which will be the official representation of American Foundrymen's Society.

Mr. Stazinski is general superintendent of General Electric's foundries at Lynn and Everett, Mass. He was very active in the technicial sessions at the recent AFS 1953 Convention, contributing valuably to the evaluation of molding processes at the sand division shop courses.

The Australian Institute is holding its meeting during the week of August 30-September 5, incorporating, for the first time, an exhibition of foundry equipment. The Sydney Town Hall will be used for the exhibit, which is thought to be the first of its kind ever held in Australia. The technical sessions are planned to cover recent developments in ferrous, non-ferrous, and light alloy foundry fields. Mr. Stazinski's paper will summarize American progress in shell molding.

Mechanization is Keynote For 1954 AFS Convention

Mechanization is the early keynote for the 58th annual Exhibit and Convention of American Foundrymen's Society, scheduled for May 8-12, 1954, at Cleveland.

Inquiries received to date from prospective exhibitors indicate an unusually strong trend toward the display of new equipment and products designed expressly for the foundry industry.

With mechanization becoming an integral requirement in foundry planning, progressive foundrymen will have an unprecedented opportunity to see most of the new developments in the field, gathered together on the spacious floors of Cleveland's Public Auditorium. New and improved production methods that will add to efficiency and lower costs, will be on display. Nowhere else can the foundryman obtain such comprehensive coverage of the metals casting industry under one roof.

Technical Program

While planning for the Exhibit is proceeding, the various technical committees of the Society have also been active. Most of the program and papers committees of the several divisions have scheduled meetings for August to explore the opportunities presented at Cleveland, and to formulate a program that will equal or surpass the high technical levels that have been attained in the past.

Shop courses and round table conferences are again scheduled in every major field of foundry activity. English, German, and Australian foundrymen have been invited to submit exchange papers at the 1954 Convention, highlighting the major technical developments from their areas.

Although the time is comparatively early as yet, the vast degree of complexity and the intricate planning necessary to present a well-managed program with something of interest in all fields, requires year-round activity at AFS national headquarters.

The AFS Exhibits Committee met on July 14 in Chicago to set plans for the 1954 Cleveland Convention. Shown, from left, standing: A. A. Hilbron, AFS Convention and Exhibits Manager; H. J. Hiemann, Hydro-Blast Corp., Chicago; F. B. Flynn, S. Obermayer Co., Chicago; J. A. Gitzen, Delta Oil Prods. Co., Milwaukee; H. J. Heine, AFS Asst. Technical Director; C. A. Sanders, American Colloid Co., Chicago; A. J. Tuscany, Jr., F.E.M.A., Cleveland; E. F. Kindt, Kindt-Collins Co., Cleveland; C. V. Nass, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago; R. L. McIlvaine, National Eng. Co., Chicago; W. W. Maloney, AFS Secretary-Treasurer. Seated, from left: Thomas Kaveny, Jr., Herman Pneumatic Machine Co., Pittsburgh, Pa.; L. L. Andrus, American Wheelabrator & Eqpt. Corp., Mishawaka, Ind.; L. H. Heyl, Federal Foundry Supply Co., Cleveland; AFS Vice-President F. J. Dost; AFS President C. L. Carter; and C. B. Schneible, Claude B. Schneible Co., Detroit, president, F.E.M.A.

The Host City

Cleveland, site of the 1954 Convention and Exhibit, is one of the nation's most ideal convention cities. Its location on the southern shore of Lake Erie is central to most sections of the industrial east and midwest.

The city is the hub of one of the largest agglomerations of manufacturing and basic materials plants in the country, with particular emphasis on steel and parts manufacturing. The foundry industry is well represented in the metropolitan area, ranging from small job and pattern shops to such huge plants as the Ford Cleveland Foundry.

The Public Auditorium, which will house the 1954 Convention and Exhibit, is very close to the center of the city. It is one of the public buildings grouped alongside the Mall, a 17-acre garden spot that represents an investment of over $40 million. Overlooking Lake Erie and very close to the central Public Square, the $10 million auditorium is partially underground and boasts five halls with 252,046 sq ft of floor space, three theatres, and seven meeting rooms. It will provide ideal housing for the 1954 meeting, which promises to be one of the greatest in AFS history.

Let's Look at High-Pressure Molding

R. W. HEINE / *Asst. Prof., Met. Eng., University of Wisconsin, Madison, Wis., and*
T. E. BARLOW / *Sales Mgr., Eastern Clay Prods. Dept., International Minerals & Chemical Corp., Chicago*

During the past year, rumors concerning the high-pressure molding project at the University of Wisconsin have circulated within the foundry industry. Facts behind the rumors are reported here by Prof. R. W. Heine of the university and T. E. Barlow, Eastern Clay Products Dept. of International Minerals & Chemical Corp. Eastern Clay sponsored the project.

■ High-pressure molding, as the name implies, consists of molding green sand under unusually high pressures, in many cases approximately 600 psi. Some work as low as 80 psi has been included in the same category. The sand used is more nearly related to ordinary green sand than to resin or oil core sand. However, no water is required or used. Strength is obtained by the activation of a resin coating by an organic solvent. The process is related to the original "waterless sand" described in 1946 by B. H. Weston, although the materials used are not entirely the same.

Attempts to use higher molding pressure have been made in past years. Early patents on stack-molding discussed pressures which closely approximated those being used today. During World War II, several foundries striving for precise casting-dimensions worked along the line of higher squeeze pressures. However, these attempts have been limited by the characteristics of the ordinary molding materials.

One principal limitation has been a lack of flowability, which prevented close reproduction of the pattern, even with high pressures. This factor required the development of a molding medium with unusual ability to flow, and to continue to flow under increasing loads. Waterless sands studied during this project have the flowability required. For example, with this material, 150 grams of sand are used to make a 2-in. standard green-strength specimen. But the same sand molded at 600 psi requires 180 grams or more to make the same size specimen. This represents a 20 per cent increase in density as a result of flowability under pressure. Only a correctly proportioned waterless sand will show this response.

Another limitation of normal sand is the excess water present. High pressures will squeeze water out of molding sand and deposit it on the pattern as mud.

(Left)—High-pressure molds, made experimentally in metal core boxes, have high strength, can be handled like dry sand molds. (Center)—Small high-pressure molds poured without flasks or jackets readily withstand ferrostatic pressure of metal as well as load of mold weight. (Right)—For convenience in developing wide range of controlled pressures, early work in high-pressure molding was done in testing machine.

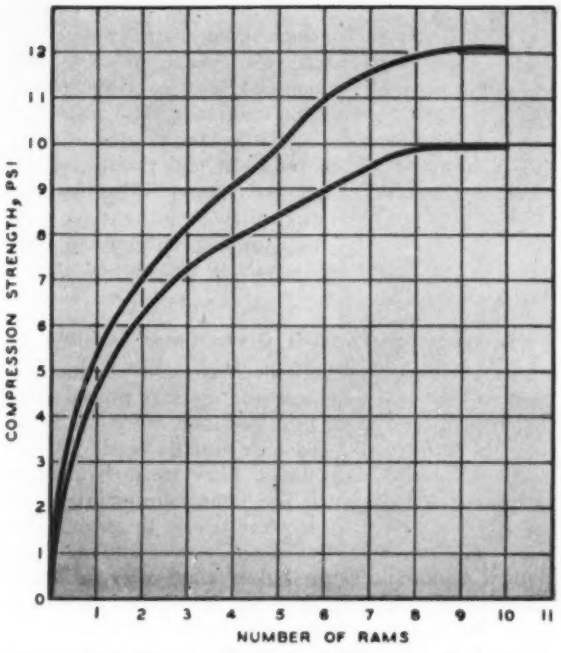


Fig. 1—Strength curves for two high-pressure sands developed with AFS standard rammer.

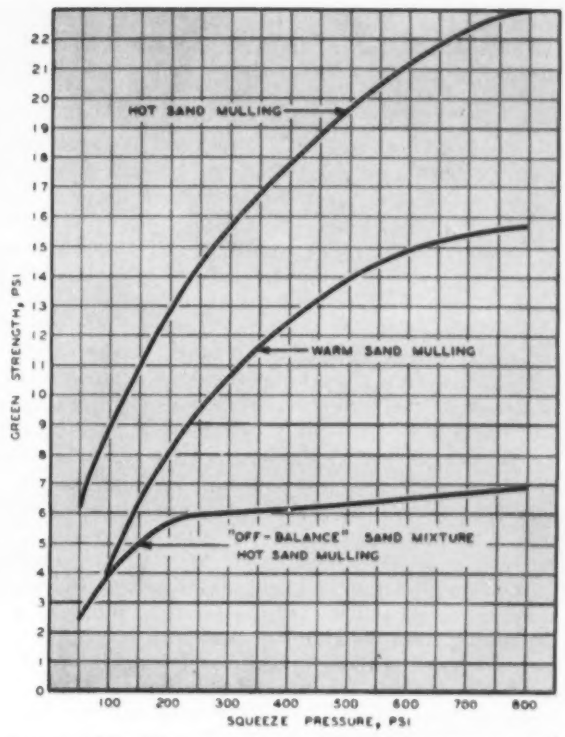


Fig. 2—Strength curves for three high-pressure sand mixes squeezed at varying pressures.

Theoretically, a perfect proportion of moisture and clay might resist such a water extraction, but ideal proportions of sand, clay and water are not commercially practical. Furthermore, if they were available, they would lack workability. For that reason, the research work has utilized the process for waterless sand. In this process, the sand grain is coated in use with a carbon resin or combination of carbon resins. These resins are then made sticky or tacky by the action of solvent or solution, somewhat as clay is made sticky by the addition of water.

A further limitation to high-pressure molding work in the past has been a lack of adequate molding, pattern and flask equipment. Perfect pattern equipment is required if true, precision castings are to be made. The pattern must have a hard finish. No lead, solder, or wax fillets and fillings can be tolerated. The surface must be smooth and without even minute back draft. They must be mounted tightly against the pattern plate. The extreme flowability of the waterless sand would permit sand to move through the joints of many pattern plates now in use. Cope-and-drag equipment is probably essential because matchplates could not withstand the high pressures being used. The flasks must be strong and rigid. (The research work was actually done using core boxes since the small molds were so strong they could be handled and poured without either jackets or flasks.)

Can't Jolt Sand

The molding equipment was developed by Donald Gerlinger of Walter Gerlinger Inc., Milwaukee. It is essentially a hydraulic-squeeze strip machine, although diaphragm squeeze is not out of the question at least at medium pressures. No jolt is needed or possible with the highly flowable sands being used. Any attempt to jolt just makes the sand jump up and down in the flask. However, high pressure squeezing provides maximum density throughout the mold without the need for jolting, tucking, peening, or ramming.

Mulling equipment is necessary and both pressure and temperature during mulling are essential. There are no moisture-loss problems with hot sand because there is no moisture to lose and in some mixtures it is advantageous to charge hot sand.

Limited Commercial Runs

The research phase of the work has reached the position from which pilot plant and semi-commercial runs can be and are being made. Much of the pilot-plant work is being done with testing equipment such as a standard tensile machine to develop the high pressures required. Only one commercial molding machine has been built for maximum pressures so that commercial type runs must be limited temporarily. In the meantime, much of the work is being done at medium pressures by using a pattern and flask no larger than the pressure cylinder of the molding machine.

For initial use, a clean, fine silica sand is required. We prefer approximately 90 AFS fineness with a screen distribution on four screens and adequate fines. An average fineness of 110 to 130 has also been used successfully. The clean sand is first treated with 1-1½ per cent liquid resin with sufficient mulling to distribute the viscous liquid over the sand grains. The liquid resin is followed by an addition of 0.5-1.5 per cent dry resin. This dry resin increases the viscosity of the liquid and, by both chemical and physical reaction, develops strengths on the order of 4 to 7 psi

on a green-compression testing machine, using three rams and a standard 2-in. specimen. The last addition is either southern bentonite or silica flour, or both. This addition dries up the sand and develops some additional strength.

The operating strength of the sand is developed under pressure as illustrated in Fig. 1 and 2. Figure 1 shows how repeated ramming brings the strength up to 10 to 13 psi green strength. Figure 2 shows the effect of pressure in creating strength of from 18 to 30 psi. Strengths up to 60 psi can be developed by larger additions of resin, but are not normally required because of the high density of this type of mold. The lower curve in Fig. 2 illustrates a sand which is not "in balance." This is not a good high-pressure molding sand. It contains either excess liquid or excess dry resin. A skilled operator can readily determine the nature of the trouble by feel. The response to pressure is an accurate method of evaluating high-pressure sands to determine the proper balance for a given sand and type of mulling equipment.

All of the above applies primarily to the initial use of the sand. The sand can be shaken out and reused as in a normal system. During pouring, the heat of the casting coats the grains of sand with resin. Therefore, on reuse, mulling pressure and temperature are much less critical. The normal addition for make-up is liquid resin. However, long commercial runs may later indicate a need for additional dry resin from time to time to maintain the proper level of organics. In most work, we have found that no additions are required for the first few uses of the sand. This indicates that the losses of resin on reuse are expected to be low and economical.

Long Bench Life

Having no moisture to contend with, the sand has almost infinite bench life. Sand may be made today and used tomorrow—or next week, without difficulty. Another interesting feature is the elimination of riddling or screening a facing on the pattern. Lumps do not constitute a problem because the sand flows so rapidly under pressure. We have frequently made a mold and then broken it intentionally into three or four chunks. The chunks were put back into the flask and remolded exactly as with new sand. The extended bench life is reflected also in the absence of hot sand problems. In fact, some heat is required for the initial use of the sand or until such time as casting heat has permitted the resin to coat the grains.

The metals cast in high-pressure molds at the time of writing include gray iron, malleable iron, nodular iron, brass, bronze, and aluminum. In all cases, cleaning time is at a minimum. Over-cleaning can quickly roughen the surfaces obtained or destroy the close casting tolerance which is apparently limited only by the accuracy of the pattern equipment.

Gating problems seem to be similar to those for shell molding. The metal must be choked ahead of the ingate. Metal flow must be relatively free from turbulence. Cooling rate in the high density mold is retarded as compared with ordinary molding methods. This may require changes in risering or feeding practice in larger castings. These important details must be worked out more extensively before the process can move from "laboratory success" to "commercial success." In the meantime, the operations on a pilot plant or restricted commercial level continue to expand as rapidly as molding equipment and improved bonding resins become available. At the present time, this phase of the work indicates real promise of an economical and practical tool for producing castings to closer pattern tolerances with molding, flask, pattern, sand-handling and mulling equipment only slightly modified from standard techniques of the modern foundry.

Believe High-Pressure Green Cores Feasible

Internal cores have not been covered by this preliminary discussion because the castings produced in the laboratory foundry have not included cores. However, the molds produced have usually been made in core boxes rather than flasks. They are then handled and assembled in much the same manner as baked cores. Therefore, there is every reason to assume that green sand cores made by the same process and materials could be substituted for baked sand cores for many sizes and shapes. Shell cores could be used with ease since the resins in the burnt shell core sand are compatible with the high pressure resins, and core sand dilution would be at a minimum. Ordinary oil or resin cores could be used when normal tolerances are permitted.

Used high-pressure sand may be bonded with special materials already developed to permit production of baked cores composed partially or entirely of reclaimed sand. The exact type of core practice will depend upon the requirements of the casting and the economy of the various techniques available. In any case, the base sands chosen for the internal cores will have to be of essentially the same fineness and screen distribution as the desired high pressure sand. If this precaution were not followed, the core sand dilution would rapidly reduce the fineness of the molding sand and detract from the finish and casting tolerance desired.

Mystery of the Credo Cleared

The Patternmaker's Credo, which appears in the front of the PATTERNMAKER'S MANUAL, AFS publication, has been warmly appreciated by many foundrymen readers. Some of them, however, have wondered who Edward Leslie might be.

Mr. Leslie, who granted permission to use his credo without remuneration, writes:

"Regarding myself, I am a patternmaker, working at present at the Pacific Foundry in San Francisco. Have been in and out of the (foundry) trade over the years. Have been in the jobbing business twice, selling out my interest to enter other fields of endeavor having to do with advertising and the creative side of the printing business. Literature, art, and music are my hobbies. Many years ago I edited the mechanical problems pages in the *Patternmakers Journal*."

We hope the mystery of Mr. Leslie's identity will have been resolved by this somewhat abbreviated biography.

Oil-fired pit furnaces. Note storage of immediate supply of crucibles over the furnaces. These crucibles will be dry and warm when put into use.

Use and Abuse of Crucibles

R. H. Stone / *Sales Mgr., Vesuvius Crucible Co., Pittsburgh, Pa.*

Cost of crucibles per 100 lb of metal melted has steadily declined in recent years due to improved equipment supplied by crucible manufacturers, furnace makers, and refractories producers. And to better practice among foundrymen. Best care and use described here will keep crucible cost at a minimum.

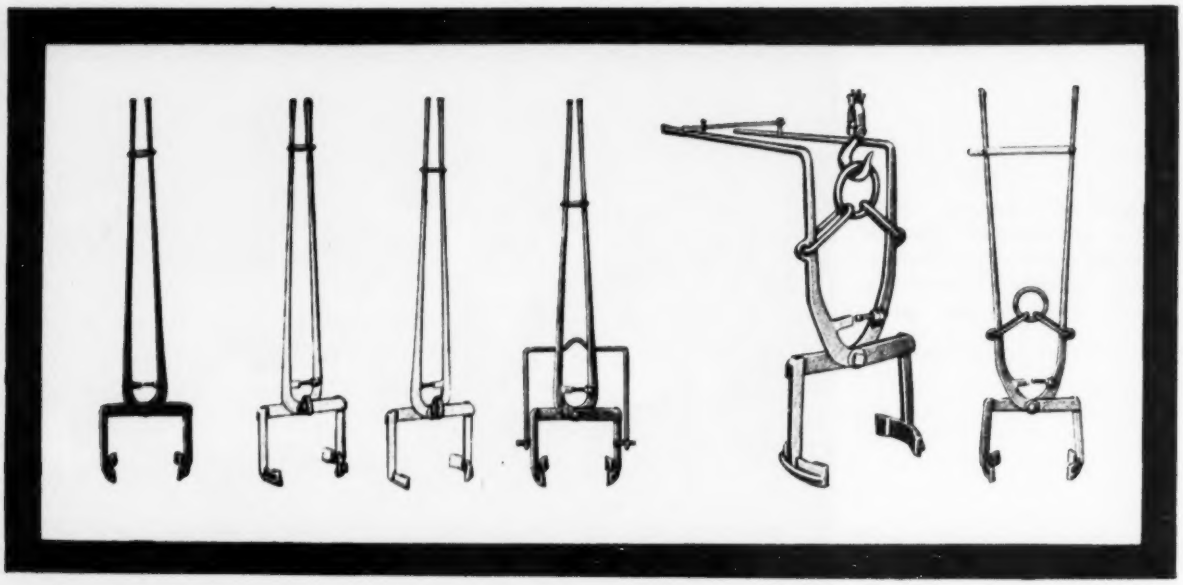
■ Care of crucibles, on the part of the foundry, begins when the truck driver shoves a crate or carton of crucibles off the end of his truck and the package drops four or five feet to the ground. More commonly, there is a receiving dock and the delivery is made at truck level and with the utmost care and thoughtfulness. You—the foundryman—take over at that point.

Don't store crucibles in the original container. Examine the container for evidence of rough handling. Unpack immediately; inspect each crucible carefully. If it has been cracked in transit defects may be detected by close scrutiny or by a method called "sounding," consisting simply of tapping the crucible lightly with a hammer handle. If cracked, the sound will be dull; an uncracked crucible will give a clear ring.

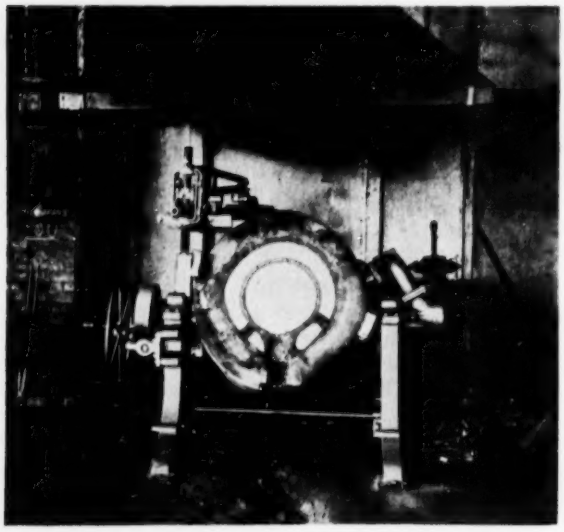
Place the crucibles in warm and dry storage. It is good practice to keep the different sizes grouped separately so that a check of stock can be made at a glance. At least four weeks' supply should be on hand. If keeping crucibles at outdoor temperatures is unavoidable, it will then be necessary—particularly in winter—to bring them in and warm them two or three days before putting them in the furnace.

If yours is an average foundry, you will have tilting and stationary crucible furnaces requiring both long-lipped and small-lipped crucibles. If you operate only tilting furnaces, you will probably also be using the small-lipped crucibles, or graphite ladle liners, for carrying molten metal from the furnace to the flasks.

Long-lipped crucibles in the tilting furnace should rest on a base block or pedestal that is at least as



Various types of crucible tongs with closing limit stops. From left: plain; with hook; with eye bolt; with bail; with bent handles, links and ring; and with links and rings. Limit stops keep tongs from crushing crucible.



Furnace in tilted position, cover removed. Note the blocks on either side of the lip supporting crucible.

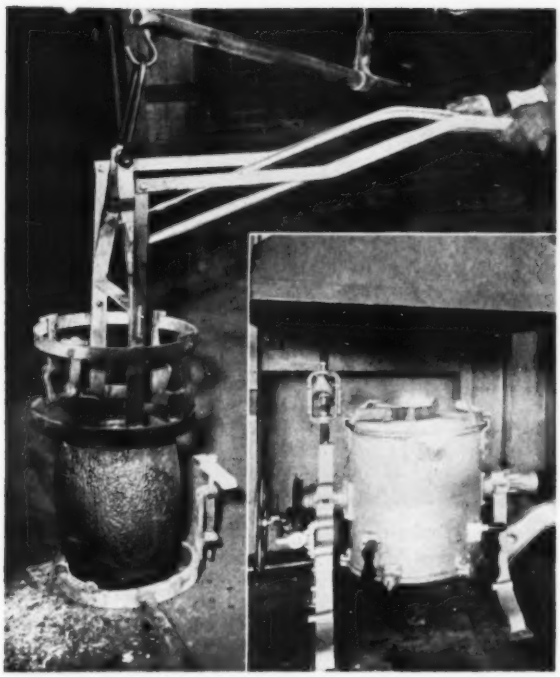
refractory as the crucible. Usually crucible and base block are of similar composition that will maintain the crucible throughout its life in the desired position. The crucible should be carefully centered in the furnace and at such a height that the long lip will clear the furnace shell and lining. Close the gap with a fire-clay mortar. To brace the crucible in the furnace, use two blocks which may be layed into the lining, one on each side of the lip about 50 to 60 degrees apart and about 3 or 4 in. down from the top of the crucible. These blocks will then support the weight of the crucible and its contents when the furnace is tilted forward. No blocking is needed at the back. If more than two blocks are used there is danger of squeezing and cracking the crucible as it expands and contracts with the heat.

Base blocks made of the same or similar materials as the crucible—with good heat shock and oxidation resistant characteristics—are best. The base block should be the same diameter as the bottom of the crucible it supports. The height is determined by the location of the burner port, the center line of which should be on a level with the top of the base block. Also, the base block must support the crucible at the desired height in the furnace. This is particularly important in the tilting type furnace because the base block must support the crucible so that the lip will not ride on the furnace shell or the top of the lining.

For the same reason, the block must be refractory enough so that at furnace temperatures it will not soften or slump, allowing the crucible to tilt or settle out of position. In both stationary and tilting furnaces the top of the crucible should be two or three inches below the bottom of the cover. This spacing will provide sufficient area for the proper rate of escape of the products of combustion.

Variations in design of base blocks to increase life, efficiency, etc., are available. The most familiar design feature is the inclusion of grooves across the top, intended to admit more heat to the crucible bottom. This purpose is accomplished if the heat distribution, top to bottom, inside the furnace, is uniform. If the atmosphere at the base block level is excessively oxidizing, these cross grooves can do more harm than good by oxidizing the bottom of the crucible. Base blocks are also available in three or more vertical segments and can be adapted to varying sizes of crucibles by moving the segments either farther apart or closer together. Such blocks also admit heat to the crucible bottom.

Crucibles in stationary or lift-out furnaces may stick



"Cradle" tongs shown in open position. Note that wedges suspended from upper ring are hanging free. (Inset) Tilting crucible furnace with four burners using city gas. Note angular direction of burners.

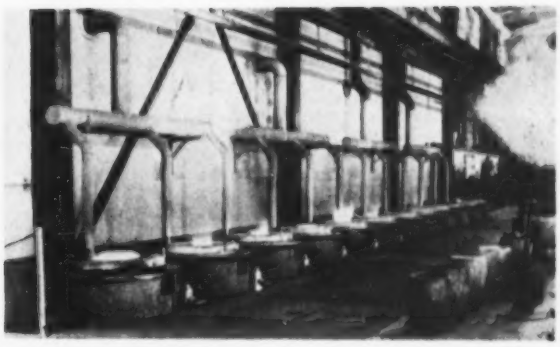
to the base block and be damaged by the attempt to separate them. Parting materials such as fine graphite or silica flour are effective but difficult to apply. The simplest method to overcome sticking is to wet a piece of corrugated carton and drop on the base block just before setting the crucible. If the furnace is cold use the carton board dry.

Crucibles in Operation

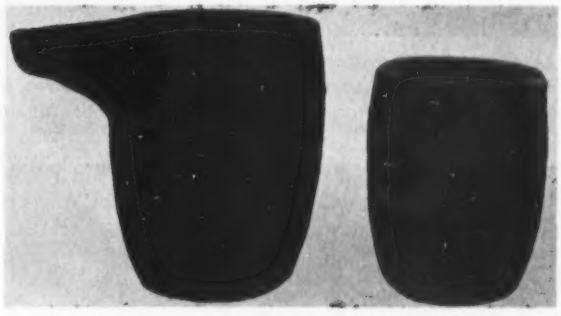
The crucible, if dry and warm, is ready to go into the hot furnace without annealing or preliminary heating. If any special precautions are necessary in the introduction into service of a new crucible, the manufacturer will make sure such instructions are given to the furnace operator or melter.

Tongs and shanks used for handling crucibles must fit to avoid damage. The tongs must clear the top of the crucible and the blades of the tongs must bear evenly against the sides of the crucible. The tongs should be gently lowered, not dropped, down on the crucible and centered vertically before gripping and raising the crucible. Some foundries are equipped with an iron casting the exact shape and size of the crucible which is used to check and reform the tongs as often as necessary.

Tongs are available so designed that they close until they make contact but do not further squeeze the crucible. In one design, this is accomplished by adjustable bumper bolts fastened one on the inside of each tong handle. These bolts meet end-on when the tongs grip the surface of the crucible and the tongs cannot be closed any further. Another type, called basket tongs, is designed so that one size may be used



Stationary crucible furnace installation in U.S. Naval Gun Factory, Washington, D.C. Natural gas fuel is used. This type of good housekeeping will pay off in better crucible life and sound castings.



Crucible on left is for use in tilting furnace. On right is standard lift-out type of crucible that is used in stationary furnaces.

with two or three successive crucible sizes, or take care of variations in one size.

When the crucible (stationary or lift-out furnace) is ready to pull, the tongs are gently lowered, adjusted, and the crucible removed and set in the carrying shank. Like the tongs, the shanks should fit the crucible, the surface tapering and the upper and lower diameters such that the shanks seat just below the bilge. As the crucible wears, it may be necessary to maintain the fit of the shanks by the use of shims. Flat pieces made for the purpose should be used rather than irregular pieces such as sprues or anything else that may be at hand. Such pieces will have points and edges that are forced into the crucible wall by the pressure of the shank.

Where crucible furnaces are operated with coke or coal fuel, the tongs must be carefully worked down over the crucible so that when the tongs are in position to make the lift, there will be no pieces of coke caught between the tong blades and the crucible. Likewise, after the crucible is lifted clear of the furnace, scrape the bottom to remove any pieces of coke which would otherwise push a hole in the bottom when the crucible is set down in the shank. The shank to receive the crucible should be placed on a bed of loose sand to further protect the crucible bottom.

The empty, lift-type crucible is handled customarily by a pair of single pincer tongs. This practice is acceptable if done with some degree of care. Not recommended is the practice of sliding the crucible across

(Left) Pouring off with crucible uncovered creates objectionable and dangerous smoke and fumes. Same operation is shown (right) with crucible covered to prevent fumes.

Refractory graphite block suspended from cover hangs down into metal in front of lip, acting as skimmer. Left photo shows same operation.

High-frequency, lift-coil type electric induction furnace. Coil box has just been raised from crucible in foreground, in which charge is ready for pouring.

the floor by swinging and releasing the hold of the tongs. Rough tong handling prematurely breaks down the top of the crucible and the sliding is very apt to result in further damage reducing the crucible life.

It is a common practice to charge the crucible before placing it in the stationary furnace. The lighter portion of the charge, such as borings and gates and risers, is charged first, and ingots or bars last. Do not wedge the charge so tightly that the metal, on expanding, will rupture the crucible. Likewise, do not place ingots or bars crosswise in the crucible. In aluminum melting, ingots or bars a little longer than the inside diameter of the crucible are sometimes charged into the molten metal. Such pieces will sink and come to rest horizontally, expand before melting and push out the side of the crucible. This type of failure is readily recognized because the diameter of the hole in the crucible wall is small on the inside but widens out to a much larger diameter on the outside.

Crucible life may be greatly reduced by the injudicious use of fluxes. Unless some components of the charge are excessively dirty (in which case they should be cleaned before charging), no flux is required for non-ferrous melting. As the name implies, it is a melting, not a smelting process. If flux is required, use a minimum amount and do not add it directly on the bottom of the crucible. Premature failure of crucibles due to flux action is manifested by a rapid attack on the inside at the metal level. The wall may be thickened at this level, but that doesn't cure the evil; it only counteracts it.

Attack at the metal line also results sometimes from a whirlpool rotation of the molten metal. It is thought that too much clearance between the top of the crucible and the underside of the cover causes swirling by allowing too-rapid escape of the products of combustion. A piece of brick or crucible on top of the metal will reduce swirling.

Keep Furnace in Good Shape

Maintenance of furnace linings contributes greatly to crucible life. If the lining is allowed to become rough with holes and projections, flames will be directed against the crucible, causing cracks or oxidation. The most economical linings are the preformed radius bricks or rings made of super-refractory materials, such as high alumina clay or silicon carbide. Such linings require less frequent patching and replacements.

The burners should be directed into the combustion chamber at an angle such that the flame is directed between the furnace wall and the crucibles, and with the center line on a level with the top of the base block. With a well designed and efficient burner, all the air for combustion should enter with the gas or oil; secondary air around the burner or at other openings should be entirely excluded. Proportional mixers available for both gas and oil, which maintain

(Left) Section of used crucible, showing deep groove around inside cut by slag and flux floating on metal. Outside shows excessive oxidation and scaling of walls. (Right) Outside of used crucible, showing large unglazed and oxidized surface resulting from faulty combustion and flame distribution in the furnace.

the proper fuel-air ratio throughout a wide volume range, are strongly recommended.

Some aluminum melting and holding crucible furnaces are automatically regulated by thermostat. These controls sometimes shut off only the fuel, leaving the air on. Needless to say, when the fuel is shut off and the air blast is allowed to blow on the red hot crucible, conditions are ideal for excessive oxidation and reduced crucible life.

Very elementary equipment for supplying fuel to the crucible furnace will work, but properly designed and proportioned burners with efficient accessory equipment are much more satisfactory and economical in refractory life and quality of metal produced. Two hundred and forty pounds of red brass should be melted in crucibles with oil or gas fuel in 30 to 40 minutes. If more time is required, the furnace operation should be corrected.

Fuel Regulation

Liquid fuels are usually supplied at pressure in the range of 20 to 30 psi. If a heavy grade oil is used, some heat may be required in winter months to provide necessary fluidity. Air for combustion is customarily supplied by centrifugal blower at 16 oz per sq in. average pressure. In the proportional mixer type of burner for oil, the combination of oil and air is brought about in such a way that the ratio remains constant, regardless of the volume of combustible mixture supplied to the furnace.

In a widely-used burner for gas, the gas is introduced at line pressure at the hub of a rotary fan, being drawn in with the air, and the mixture is then supplied to the burner. In the proportional mixer for gas, the gas is reduced to atmospheric pressure and drawn into the air stream by venturi action. The air pressure is approximately 16 oz per sq in. The fuel ratio is thereby held constant and the volume of combustible gas delivered to the furnace is regulated solely by control of the air supply valve.

Coke furnaces with a forced draft are occasionally encountered and are efficient, fast melting, and produce sound metal. In the operation of these furnaces, the draft must be carefully controlled as ample heat can be generated in a coke furnace with a very moderate draft. Crucibles used in these furnaces sometimes become so soft, due to the excessively high temperature, that the lower half is actually elongated.

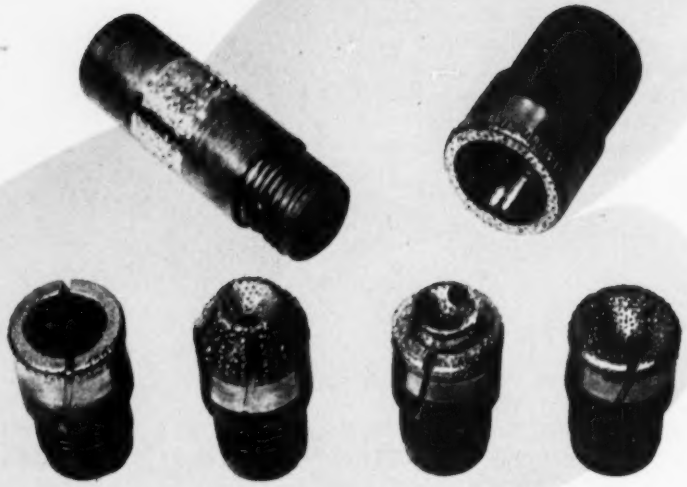
Research and practical experience have shown conclusively that slightly oxidizing conditions in the furnace provide the best conditions for the prevention of gassed castings. Therefore, burners which are easily regulated and will maintain uniform furnace atmospheres will result in higher yields and at the same time promote longer crucible life.

Two Types of Electric Crucible Furnaces

The high frequency induction crucible furnace appears to be gaining in popularity. There are two types —tilting and lift coil. In the former, the crucible, usually a special shape with uniform diameter, is permanently installed in the coil and remains there until it is ready for replacement. In the lift-coil furnace, a standard lift-out type crucible is used and the furnace coil lowered around it. When the charge is melted, the coil is raised, the crucible picked up, and carried to the molds. The composition of the crucible is adjusted to yield the proper electrical characteristics to suit the power characteristics.

When the crucible is properly adjusted to the furnace, either tilting or lift-coil, very little further care can be given to the crucible by the operator except to observe the usual precaution as to shanks, etc., previously described. Usually, full power is not applied to an empty crucible. When charged, full power may be applied at once. During melting, the crucible itself seldom rises above a red heat and may even remain dark on the outside. Crucible life in high frequency induction practice is comparable to that in fuel-fired furnaces.

In conclusion, crucible life is the result of a compromise between personal care and practical operating considerations. Cases have been observed where the owner of a small shop does his own melting and by the most painstaking personal attention and care of the crucible, may get two or three hundred heats, a figure unheard of in a busy production shop where 80 to 100 heats would be entirely acceptable. To attempt to get more would cost more than would be justified.



Types of diamond drill bits and reaming shells produced by Inco. Top left, a reaming shell; top right, a pipe bit. Bottom row, from left: coring bit, wedge reaming bit, pilot blast bit and concave bit.

Use of Diamonds as Mold Inserts

Diamonds are used as mold inserts in an unusual permanent mold operation carried on by International Nickel Co. of Canada, Ltd., at Copper Cliff, Ont. Diamond drill bits and reaming shells for the company's blast-hole mining program are produced at the rate of 100 per day by 14 people working in the modern, bright, roomy casting shop in the research building.

■ First step in the manufacture of a bit is the preparation of the die or mold in which it is to be cast. A hole is drilled in the die plate where each of the 120 to 350 diamonds is to be set. A glass vacuum pencil is used to place the stones in position in the die plate, which rests in a metal cup connected to a vacuum line to hold the stones in place. When the setting is completed, the stones are fixed in position for casting with a collodion spray.

The next stage is casting. The beryllium copper matrix in crucibles is brought to a temperature of 2000 F in one of the shop's two electric melting furnaces. The die plate, into which the melt is poured, is fitted into a mold block, along with a blank steel adapter threaded to fit standard diamond drilling equipment. A vacuum holds the units of bort (10-70 carat imperfect diamonds) in place while the metal is poured.

After being quenched, the newly cast bit is freed from the die plate, trimmed and machined. Due to the nature of the alloy, quenching makes the bit softer and easier to machine instead of harder, as in the case of steel.

The new bit is buffed in the grinding and buffing machine, which also cuts a water groove. It is then ready for heat treatment. Bits are age-hardened in a furnace for three hours at 600 F and then cooled slowly.

Diamond Recovery

Used diamond drill bits are returned by the mines and the bort is recovered by dissolving the crown of the bit in nitric acid or by an electrolytic process. After the recovered bort has been cleaned, good stones are separated from fractured scrap and returned to stock.

Particular emphasis has been placed on the removal of fumes and dust by the installation of powerful exhaust fans. In addition to the separate fans for the cabinets in which used crowns are dissolved, a third fan exhausts the dust from the grinder and lathe, while a fourth removes the heat and fumes from the furnaces through a hood and large overhead duct. As additional protection from fumes and dust, personnel working at the fume cabinet and grinder are required to wear respirators.

First step in manufacture of diamond drill bits is preparation of die or mold (above). A hole is drilled in die plate where each diamond is to be set. Pretty worker (upper right) uses glass vacuum pencil to pick up tiny diamonds and place them in position.

Crucible of beryllium copper (above) is removed from electric furnace. (Left) Die plate and blank steel adapter, which is threaded to fit standard diamond drilling equipment, are placed in one of four cups on casting table. After quenching, newly cast bit (bottom left) is freed from die plate. Excess copper is being cleaned from die plates. Freshly cast bits are seen in center of the table.

Neatly trimmed and machined, batch of new bits is ready for heat treatment (above). They are being stacked in furnace where they will be age-hardened for three hours at a constant temperature of 600 F.

Table 1—Capital Expenditures by the Foundry Industry for Air Pollution Control Equipment Compared with all Foundry Equipment.

Year	Per Cent Equipment Expenditures for Air Cleaning Equipment
1952	7.9 per cent
1951	7.9 per cent
1950	9.5 per cent
1949	14.9 per cent
1948	8.6 per cent

From statistical data of Foundry Equipment Manufacturers Association.

Air Pollution and Public Relations

JOHN M. KANE / *Mgr., Dust Control Products, American Air Filter Co., Louisville, Ky.*

The foundry industry can solve some of its air pollution problems through proper emission control equipment, some through public relations. The author presented his paper at the 1953 AFS Convention; it will appear in this year's volume of *AFS Transactions*.

■ For many years the foundry industry has recognized the need for and has consistently installed effective air pollution control equipment for its dust producing operations. The recognition of the need preceded the current national emphasis on air pollution control by such an interval that the achievements of the industry go unnoticed.

Few air pollution control officials and probably too few foundrymen appreciate that:

1. Some 10 per cent of all capital expenditures for foundry equipment has been allocated to air pollution control equipment. Table 1 shows that such practice has been true for many years. Actually air pollution control expenditures are higher than Table I indicates, as installation costs are seldom included in air pollution control equipment while many other types of foundry equipment are sold on an installed basis.

2. Development and improvements of the high efficiency dust collector designs such as the fabric arrester and present day wet type dust collectors were largely due to demands of the forward looking foundry industry and foundry equipment supplier. It is no mere coincidence that many of the major fabric arrester manufacturers are also makers of heavy dust producing foundry equipment such as abrasive cleaning and tumbling units. It was the advent of the central shakeout and the sand conditioning material handling systems in the 1930's that accelerated interest in and development of wet type collectors of high efficiency to cope with the steam, hot gases, and fine particles released from those operations.

Air Pollution As Public Sees It

For most cities today, air pollution problems are largely of the "public nuisance" types—emissions from industrial stacks of dusts that settle readily on neighborhood cars, laundry, porches, window sills, and home interiors when windows are open. Some idea of the public relations troubles that could be incurred with a "do enough to get by" attitude can be visualized when effluent loadings are estimated and typical dust collector performance is evaluated against minimum standards of acceptable concentrations outlined by many city ordinances.

While foundry dust loadings vary to the extreme with the range of metal poured and with the size and quantity of castings produced, the data in Table 2 will be typical of many a medium sized foundry. The outstanding control that is obtained is significant

TABLE 2 — AIR POLLUTION CONTROL IN A TYPICAL FOUNDRY

Operation	Standard Air Cfm	Pounds per hour Collected	Pounds per hour Discharged	Effluent Air Gr/cu ft Standard Air	Effluent Air Gr/cu ft corrected to 500F	Approximate Equipment Cost Per Cfm Standard Air	Approximate Equipment Cost In 1952 Dollars
Shakeout	15,000-30,000	100- 700	10-25	0.05-0.10	0.03 -0.06	$.25-$.40	$ 4,000-$12,000
Sand System	6,000-10,000	150- 500	5-15	0.1 -0.2	0.06 -0.12	.35- .50	2,000- 5,000
Grit Blast Room	10,000-	200- 500	2- 5	0.0005-0.1	0.003-0.06	.35- .50	3,000- 5,000
Airless Blast	3,000	200- 300	2- 3	0.05 - 0.2	0.03 -0.12	.40- .60	1,000- 2,000
Grinding Wheels	3,500	10- 15	0.5- 1	0.002- 0.1	0.001-0.06	.15- .25	500- 1,000
TOTALS	37,000-56,000	660-2015	19.5-49				$10,500-$25,000
Add Cupola (5T/hr)*	7,500	30-150	15	0.2 -0.4	0.12 -0.22	$.75-$1.50	$10,000-$20,000
Or Add Electric Furnace (5T/hr)*	15,000	12- 30	8.0	0.05 -0.1	0.12 -0.22	$.35-$ .50	$ 5,000-$ 7,500

*The control equipment considered for this melting unit will not greatly alter the discharge appearance of the stacks.

when compared with permissible fly ash emissions from boiler stacks under many existing air pollution control ordinances. A case history study, Table 3, of a moderate sized steel foundry employing 700 people and producing 40 tons of castings per 8 hour shift confirms the general pattern projected in Table 2.

In the light of the outstanding performance of the foundry industry as recorded above, it is disappointing to find the foundry one of the first industries cited by air pollution control boards. However, it is seldom that control of the major sources of dust generation is even discussed. Almost invariably the target is the visible plume from the melting furnace stacks. In the translation from "smoke abatement" enforcement to over-all "air pollution control," the convenient visual tool for checking efficient combustion of a fuel burning boiler has been stretched to encompass stacks from industrial operations. This visual or capacity yardstick is used in spite of:

1. No known correlation between weight emissions and visual appearance.

2. Substantial concentrations of coarse "public nuisance" types of dust will not be visible in a stack effluent.

3. No opportunity exists to improve the appearance by more efficient operation of the industrial process. This comment applies to a more limited extent to the foundry cupola where better control during lighting up may be indicated or where afterburning in the cupola stack can eliminate unburned combustible materials.

What Future Holds

Looking into the future, the foundry with high efficiency, dry centrifugal, good wet collectors or fabric arresters controlling snagging, swing frame, and portable grinding have little to worry about future more stringent controls for those operations. Likewise the use of good wet collectors or fabric arresters will adequately control abrasive cleaning operations and good wet collection will give high efficiency and excellent collection for sand systems and most shakeout operations.

On the other hand, control of melting furnaces

Table 3 DUST LOADING IN A MODERATE SIZE STEEL FOUNDRY

Operation	Dust Load to Collector lb/hr	Dust Load to Collector Grains/cu ft	Dust Load to Atmosphere lb/hr	Dust Load to Atmosphere Grains/cu ft
Shakeout, Sand System[1]	130	5.44	3.9	0.016
Sand Mixer Cooling Hoods[2]	75.0	0.405	1.5	0.008
New Sand System:				
Shakeout 8 x 10[1]	104	0.304	4.2	0.012
Electric Furnaces[1]	10.2	0.296	2.4	0.07
Wheelabrator 48 x 48 in.[1]	35.0	0.639	1.1	0.026
Blast Room 13 x 15 ft[3]	91.0	0.945	1.8	0.019
Blast Room 12 x 14 ft[4]	78.0	0.928	1.6	0.019
Blast Room 14 x 15 ft[3]	91.0	0.840	1.8	0.017
Airless Blast 48 x 96 in[4] and Tumbling Mills	70.0	1.045	1.4	0.021
Swing Frame Grinders[4]	15.1	0.126	1.6	0.014
Snag Grinding & Cut-off[3]	36.2	0.516	0.4	0.0054
TOTAL	725.5		21.7	

1. Weights obtained by actual sampling of inlet and outlet ducts.
2. No data available due to infrequent use of new sand system since sand reclaim system installed.
3. Weights obtained by sampling one collector system and assumed same performance on remaining two systems.
4. Loadings obtained by weighing dust actually collected for 24 hour period, assumed collector efficiency same as that tested on similar systems.

and eventually smokes from pouring operations will be expensive per pound of contaminant involved. The cost will be especially high if industry does not make a more determined effort to counteract present trends of control authorities and public to view visible plume from melting furnace stacks as a major contributor to the community air pollution problem.

If the few pounds of metal fume from ferrous melting stacks must be removed to satisfy a visual standard of performance, control will be expensive and complicated, where related to the few pounds of sub-micron particles involved. Current foundry trends of wet collector applications to cupolas and electric furnace stacks to remove all coarse particles have been noticeably retarded as acceptance of that degree of control has been debated by air pollution control authorities.

To date, the foundry industry has made little effort to tell community or control groups about its extensive and effective air pollution control installations. It is possible that such a program at the community level would do much "public relations" good, would forestall public criticism based on lack of information, and could even be helpful in giving the control authorities a better understanding of the air pollution control efforts and expenditures which actually are far above those of many other segments of dust producing industries.

W. H. Roloff (left), Roloff Mfg. Co., Kaukauna, Wis., inspects sand samples held by W. F. Scholtz, Health & Safety Dept., Allis-Chalmers Co., Milwaukee. Scene was the Allis-Chalmers safety and hygiene exhibit at the February AFS Wisconsin Regional Conference, held in Milwaukee.

Foundry Industry Faces Problem Of Occupational Hearing Loss

Prior to 1930, little attention had been paid to silicosis as an occupational disease. Very few claims were made on industry as a result of this disease. Then, starting with 1930, several states changed or amended their workmen's compensation laws to include this malady as an occupational disease and make it compensable. As a result of this change in the laws a deluge of claims was made on industry. The industry most affected, perhaps, was the granite quarries, and many of them were forced out of business.

Over a period of years, this occupational disease was studied by the medical, legal, and engineering professions. The state compensation boards also instituted studies in line with prevention and handling of workmen's compensation claims resulting from the disease.

Certain standards were set up; methods of control and prevention were developed. These standards have all worked out well and are considered fair to everyone, both employees and employers, at the present time. Methods of prevention have been developed so that this disease—while it is considered a potential hazard—has been controlled to the point where new cases are rare.

When silicosis was first recognized as a compensable occupational disease, many insured companies and their insurance companies were not prepared to meet the many claims and they had no financial reserves available. Industry was taken by surprise and did not have any proven knowledge to cope with this situation.

Industry is now confronted with a similar situation which can be potentially greater than the silicosis threat: a so-called occupational disease based on loss of hearing. Deafness, or impaired hearing, is a very common ailment with many people; and yet it is surprising how little information we have on the effect of noise on hearing.

For the past fifty years, industry and our very mode of city life have been changing. These changes have constantly increased noise, not only in the industrial plant but in the city. This environmental noise may be a source of irritation to almost everyone, and yet it is taken as a matter of course and little is known about how these noises are affecting our hearing. Many industries cause noise, and it is quite possible for some people to suffer from loss of hearing when exposed day after day, to a heavy, vibrating noise.

Studies are being conducted by such organizations as the Industrial Hygiene Foundation in Pittsburgh to determine how industrial noise may affect the average person's hearing. Also, standards are being sought to determine what percentage of hearing loss is associated with age. Studies are underway to determine what types of noise affect an industrial worker's hearing—a large concussion or a low, high-frequency, vibrating noise. Instruments are being developed to measure these conditions.

It would be to industry's advantage to study its own plants and the people in it so that methods of control may be established for occupational loss of hearing. The following are some of the things we can look for:

The causes of noise—vibration, impact, etc.

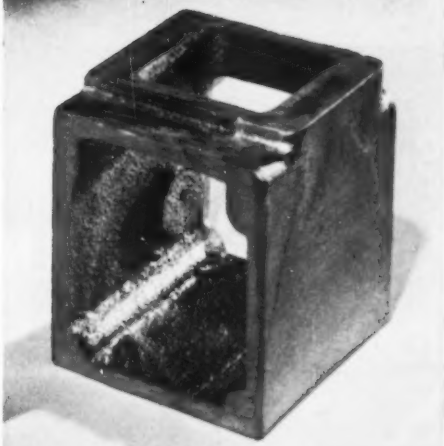
How to eliminate it from working areas in an industrial plant.

What effect it has on the hearing of individuals. How does age affect hearing.

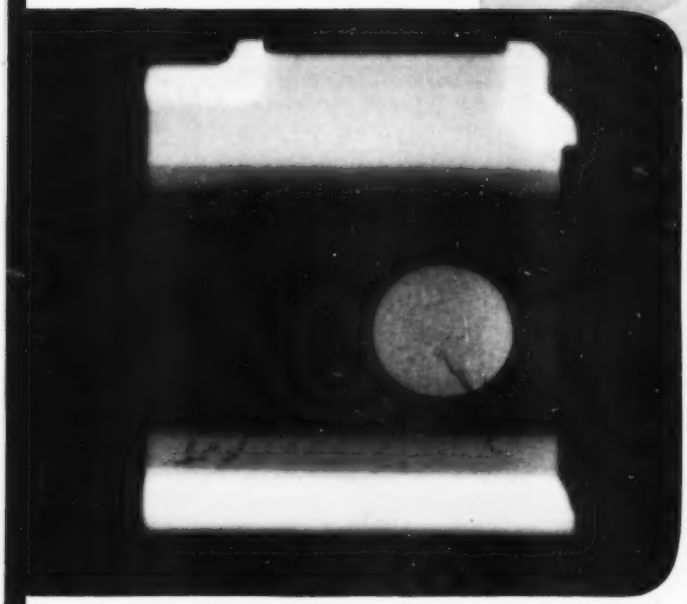
Measurements should be made of all noisy locations. An acoustical test for employees should be developed. These are problems for the industrial hygienist.

The sooner each industrial plant recognizes the problem and obtains the elusive answers, the sooner it will be in a position to control this health and economic threat to industrial employees.

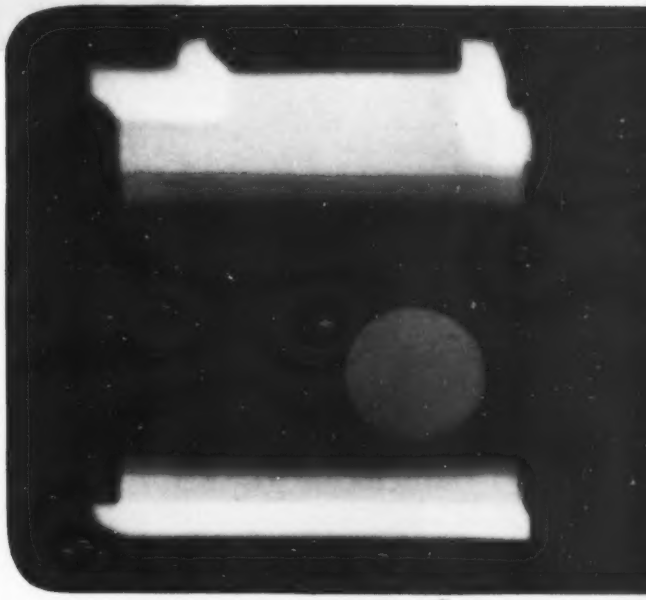
When shrink occurs...



Yield shrinks, too...



Radiograph shows recurring defects due to shrinkage.



A change in gating produced sound castings.

Radiography helps avoid shrink

Shrink can pose a real problem in casting 355 aluminum. It did with this instrument housing.

But radiographs of the pilot runs showed a recurring pattern of defects. This suggested a change in gating which quickly corrected the difficulty.

This is a typical reason why more and more foundries are making full use of radiography. It proves the soundness of their work—helps build a reputation for prompt delivery of good castings.

If you'd like details on how Radiography can improve your operations, get in touch with your x-ray dealer. Or, write us for a free copy of "Radiography as a Foundry Tool."

EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography...

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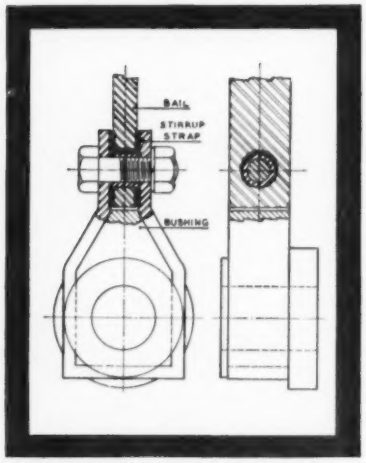
IT'S TRUE... Binding due to heat distortion COMPLETELY ELIMINATED in this revolutionary Universal Bail Design

Industrial Model 592T ladle with universal bail.



More flexibility than a universal joint. Ample vertical and horizontal flexibility. Misalignment taken care of by rotating swivel action.

Here is one of the really fundamental advances in geared ladle design. Binding problems caused by the steady rise in pouring temperatures have been solved . . . with no sacrifice in strength, safety, or simplicity.

You get four distinct advantages with this new universal bail by Industrial Equipment:

1. **Binding due to heat distortion is eliminated.**
2. **Binding due to misalignment is eliminated.**
3. **Gear wear due to binding is eliminated.**
4. **No lubricatior or adjustment is ever needed.**

This new bail is the result of a project on which Industrial Equipment has been working for over four years. Many novel and ingenious designs were proposed and discarded before the final design was accepted. Like all good things it is simple. Yet notice that in addition to simplicity it is rugged, safe, and dependable.

You should also know that this new bail has been thoroughly foundry tested. We emphasize this because the more severe the conditions, the more evident was its design superiority. Operators, for example, say they have never operated a ladle that was easier to handle *regardless of conditions.*

Look to Industrial Equipment for the really basic improvements in foundry pouring and handling equipment. *Write, wire, or telephone today for full details.*

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AFS Board of Directors Holds Annual Meeting

Members of the AFS Board of Directors, assembled in Chicago July 23-24 for the Annual Board Meetings of the Society, approved a complete revision of the AFS By-Laws calculated to materially improve liaison between the National and the Chapter organization.

In addition, the Board of Directors received reports from staff officers and Board committees on activities during the past fiscal year, approved estimated budgets of Income and Expense for the two-year period ending June 1955 and organized for efficient conduct of Society affairs during 1953-54. The retiring Board met July 23 with retiring President I. R. Wagner in the chair. The newly organized Board, with President Collins L. Carter presiding, met the following day.

Of the 18 members of the Board of Directors, 14 attended the meetings, including retired President Wagner, new President Carter and Vice-President F. J. Dost. Retiring Directors J. J. McFadyen, W. L. Seelbach, F. W. Shipley and James Thomson were honored at the annual dinner for retiring Directors the evening of July 23.

The following Directors attended the first meeting of the new Board on July 24:

H. W. Dietert	J. T. MacKenzie
M. A. Fladoes	A. D. Matheson
E. C. Hoenicke	C. V. Nass
A. L. Hunt	A. M. Ondreyco
W. J. Klayer	H. G. Robertson
J. O. Klein	G. E. Tait
M. J. Leffer	

Reports for the Year

Following the annual reports of the Secretary, Treasurer and Technical Director, H. J. Heine was introduced as the Acting Technical Director, replacing

continued on page 93

Here are members of the AFS Board of Directors whose terms of office have recently expired. Top row, Past President Walter L. Seelbach, (left) Superior Foundry, Inc., Cleveland; and James Thomson, Continental Foundry & Machine Co., East Chicago, Ind. Bottom row, from left: Frank W. Shipley, Caterpillar Tractor Co., Peoria, Ill.; E. C. Troy, Foundry Engineer, Palmyra, N. J.; J. O. Ostergren, Lakey Foundry & Machine Co., Muskegon, Mich.; and J. J. McFadyen, Galt Malleable Iron Co., Ltd., Galt, Ont., Canada. Terms ended with July 23 meeting.

John Howe Hall Dies Suddenly

John Howe Hall . . . 1881-1953

SUCCUMBING suddenly to a heart attack at the age of 72, John Howe Hall, one of the nation's foremost metallurgical engineers, died on August 4, 1953, at his Tarrytown, N. Y., home. He had been ill since January of this year.

Mr. Hall made many outstanding contributions to the development of the steel founder's art, pioneering in the heat treatment of steel, which was adopted as standard in the manufacture of cast armor during the recent war.

His long career in the industry included association with Bethlehem Steel Co. (1904-06); Buffalo Crucible Casting Co.; and Taylor-Wharton Iron & Steel Co. (1906-37). In 1937 he became an engineering consultant and was with General Steel Castings Co. from 1942 to 1945.

Mr. Hall was awarded one of the first two medals given by American Foundrymen's Society (then AFA) when he received the John H. Whiting Gold Medal in 1924. He delivered the annual Charles Edgar Hoyt Lecture at the 1949 AFS Convention, speaking on *"Composite Structures Utilizing Steel Castings and Welding Methods."*

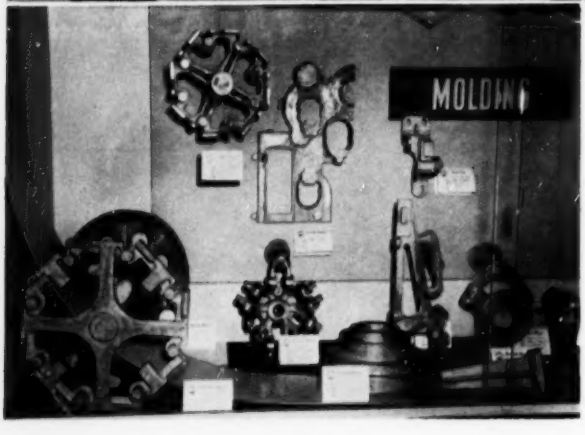
Other recognition included a citation from the Steel Founders' Society in 1946. He was the Henry M. Howe Memorial Lecturer for American Institute of Mining and Metallurgical Engineers in 1929.

Mr. Hall's first book, *"The Steel Foundry,"* (McGraw-Hill) was published in 1914, with many editions since. He made two contributions to the Encyclopedia Americana on steel castings manufacture, and the production of crucible steel. He was a prolific writer on steel foundry practice and was considered one of the nation's outstanding authorities in the field.

In addition to AFS (of which he was an Honorary Life Member), he was a member of A.I.M.E., A.S.T.M., A.S.M., the Iron and Steel Institute of Great Britain, and the Harvard Engineering Society. He was a 1903 Harvard graduate, receiving his master's degree in 1904.

Besides his wife, Mrs. Gertrude H. Hall, he is survived by three daughters, two sons, a sister and two brothers.

Industrial Arts Awards Include Casting Crafts



Pride in craftmanship is evident in the work of junior and senior high school students who compete each year in the National Industrial Arts Awards competition sponsored by the Ford Motor Co. Shown are portions of the exhibit of patterns and castings which this year won national recognition for the young craftsmen who made them. Museum of Science and Industry (Chicago) visitors viewed the exhibit even before it was complete. Installing the displays (upper left) is Leo Fertala, now with an exhibits concern, who spent seven years as a patternmaker in the Bleiberger Berg Werks Union, Corinthia, Austria. These and displays in 12 other craft classifications can be seen at the Museum through Sept. 30.

Practical Questions and Answers

Statuary Casting

What is the most suitable copper-base alloy for casting thin sections such as small statuary that is to be silver plated? To get good detail, can these alloys be cast in plaster?

The following alloys are commonly used: numbers indicate per cent:

Cu	Sn	Pb	Zn
88	6.5	1.5	4
85	5	5	5
81	3	7	9

A mixture of 70 to 80 per cent plaster of Paris, the balance fibrous talc, is commonly used for ornamental and statuary bronze. Use a relatively high proportion of water, about 120 to 180 parts (by weight) to 100 parts of plaster.

Charging Overtime

How do you justify charging overtime to supervision and indirect operators?

Usually, when overtime is worked, it is the result of poor planning and scheduling, or low performance. No company likes to work its people overtime, and therefore discourages it. Supervisors are, in effect, operating their own business. If they operate their departments efficiently, they get extra pay.

C. J. Pruet, *Chf. Ind. Eng.*
McWane Cast Iron Pipe Co.
Birmingham, Ala.

Cupola Charger

Kindly advise where more information may be obtained in the cupola charger using buckets hung from a chain conveyor mentioned in "Talk of the Industry," AMERICAN FOUNDRYMAN, page 27, May, 1953.

The charger is described in detail in the January 29, 1953 issue of *Foundry Trade Journal*, page 119-122. It was devised at Croyden Foundry, Ltd. Pendulum buckets carried on an endless conveyor chain are loaded at ground-level charge-make-up benches, elevated to charging level, and automatically tripped at the correct cupola.

Each bucket has a spring scale for weighing the charge, normally 150 lb. Coke and limestone are also carried in buckets but are measured by volume rather than weight. There are four sequences of 20 buckets, each color-coded to indicate the type of charge it is to receive and fitted with a tripping bar that can be adjusted to insure dumping into a predetermined cupola.

Speed of the conveyor can be controlled to keep up with melting rate. Should the conveyor get too far ahead of the cupolas, the buckets can be made

continued on page 72

Now, There's an Idea!

Practical ideas, developed and proved in foundries and pattern shops, are presented in this column. "Now, There's an Idea!" helps *American Foundryman* readers promote the exchange of ideas, the motivating force behind the A.F.S. Contributions for publication are solicited. They may be of any length, preferably short, illustrated by photo or sketch

■ Ideal soldier for holding up a pocket in a plowshare mold—and probably many other molds—is a piece of expanded metal lath. The idea was developed at the La Crosse (Wis.) Works of Allis-Chalmers Mfg. Co. where the metal soldiers are considered superior to wood. Th magnetic separator in the sand conditioner collects the expanded metal pieces for re-use.

Allis-Chalmers La Crosse (Wis.) Works uses piece of expanded metal lath, as shown here, as a soldier for holding up a pocket in a plowshare mold. These soldiers are considered superior to wood at the La Crosse foundry.

Shop Talk

continued from page 71

to pass the cupolas without discharging. Saving in coke is reported to be remarkable. The system, through cutting out the "extra shovelful of luck," appears to be saving Croyden nearly five tons a week.

Cupola Emission

We are experiencing some trouble with neighbors who complain of smoke and fumes. We use sprays to keep down the dust and actual emission from our cupolas seems low—between Ringelmann No. 1 and No. 2—during light-up. Wood is used in lighting the two cupolas; sulphur content of the fumes is low.

Smoke at light-up can be avoided by means of an electric igniter (can be purchased), or a grate and gas burner (can be made) such as described in the June, 1952 issue of AMERICAN FOUNDRYMAN, page 49. Object of the grate is to provide a roof for a tunnel built in the bed coke. The gas burner shoots a flame through the tunnel, igniting the coke. Grate, cast in the foundry, melts in about 20 minutes.

Better ignition during light-up probably will not eliminate all the complaints. The material generally causing nuisance complaints is the heavy particulate matter made up of coke, limestone, etc. These particles drop in the vicinity of the foundry but do not show up in the smoke, hence the low Ringelmann reading. Much of the matter contributing to the visible emission is probably iron oxide—a very small proportion of the total emission and hard to collect economically.

Several types of wet washers on the market can be economically installed to take care of the material creating the nuisance.

Cement Sand

We should appreciate information on the use of cement sand molds.

Cement-bonded sand is used in large jobbing work—steel, gray iron, and copper-base. Advantages reported for it include close tolerances, less shrinkage due to greater mold strength and accuracy, better surface finish, and less effort in ramming, shake-out, and cleaning. Flasks require no arbors or bars; cores have no arbors or lifting plates. Drying time is 48 to 96 hours but this rarely interferes with production schedules on large castings.

Molding presents some problems since cement sand has low green strength and will not hold up over loose pieces. If allowed to set around a pattern, it is difficult to withdraw the pattern. Typical cement sand mixtures given by C. D. Galloway in his article in the May, 1953 (pp. 67-69) issue of AMERICAN FOUNDRYMAN are:

FACING SAND

Washed silica sand, AFS fineness 41	750 lb
Reclaimed sand	750 lb
Cement, high early strength	184 lb
Water, by weight	7.6-8.2%

BACKING SAND

Reclaimed sand	1500 lb
Cement, high early strength	98 lb
Water, by weight	5.0-5.5%

continued on page 102

Calendar of Future Meetings and Exhibits

September

1-3 . . Institute of Australian Foundrymen

Town Hall, Sydney, Australia. New South Wales Div: Convention.

13-24 . . 1st International Instrument Congress and Exposition

Philadelphia

17-18 . . National Foundry Association

Plaza Hotel, New York. Annual meeting.

17-18 . . Niagara Frontier Regional Conference

Statler Hotel, Buffalo.

19-26 . . International Foundry Congress

Paris, France. Host: Association Technique de Fonderie de France.

21-22 . . Steel Founders' Society

Homestead, Hot Springs, Va. Fall meeting.

21-25 . . Instrument Society of America

Sherman Hotel, Chicago. National Congress & Exhibit.

24-25 . . Ohio Regional Foundry Conference

Netherland Plaza, Cincinnati. Sponsored by A.F.S. Cincinnati, Northeastern Ohio, Central Ohio, Canton, and Toledo Chapters.

25 . . Malleable Founders' Society

Hotel Cleveland, Cleveland. General meeting.

October

8-9 . . Michigan Regional Conference

Michigan State College, East Lansing, Mich. Sponsored by A.F.S. Central Michigan, Western Michigan, Detroit and Saginaw Valley Chapters and Michigan State and University of Michigan Student Chapters.

8-9 . . American Society for Quality Control

Masonic Temple, Davenport, Iowa. Eighth Midwest Conference.

8-9 . . Gray Iron Founders' Society

New Hotel Jefferson, St. Louis. Annual meeting.

9-15 . . 5th International Congress of Mechanical Manufacture

Turin, Italy. Production methods and parts assembly.

15-17 . . Foundry Equipment Manufacturers' Association

Greenbrier, White Sulphur Springs, W. Va. Annual meeting.

16-17 . . Northwest Regional Conference

University of Washington and New Washington Hotel, Seattle. Sponsored by Washington, Oregon, and British Columbia Chapters, and University of Oregon Student Chapter.

19-21 . . American Institute of Mining and Metallurgical Engineers

Hotel Allerton, Cleveland. Fall meeting of Institute of Metals Div.

19-23 . . American Society for Metals

Cleveland Auditorium, Cleveland. 35th National Metal Exposition and Congress.

23-24 . . New England Regional Foundry Conference

Massachusetts Institute of Technology, Cambridge, Mass.

23-24 . . National Noise Abatement Symposium

Illinois Institute of Technology, Technology, Center, Chicago.

29-30 . . Metals Casting Conference

Purdue University, West Lafayette, Ind. Sponsored by Central Indiana and Michiana Chapters, Purdue University, and the Purdue Student Chapter.

M.S.C. to Host Michigan Regional Confererence

THE 1953 Michigan Regional Foundry Conference will be held in the Union Building on the campus of Michigan State College, East Lansing, Mich., on October 8 and 9, 1953. Host chapters are Central Michigan, Western Michigan, Detroit, Saginaw Valley, and Michigan State College and University of Michigan student chapters.

General Chairman for the Conference is David W. Boyd, Engineering Castings, Inc., Marshall, Mich. He will be assisted by the following officers: Kenneth H. Priestley, Vassar Electroloy Prods., Inc., Vassar, Mich., Vice-Chairman; Kenneth F. Packer, University of Michigan, Ann Arbor, Mich., Secretary; and Prof. Charles C. Sigerfoos, Michigan State College, Treasurer.

The program, which is still subject to change, is listed below:

October 8, 1953

8:30 am: Registration opens

10 am: Speaker: O. J. Myers, Archer-Daniels-Midland Co., *"D" Process Molding.*

11 am: Speaker: Tom Barlow, Eastern Clay Prods. Co., *High Pressure Molding.*

12 noon: Luncheon
Presiding: Harry Gravlin, Ford Motor Co.
Speaker: To be announced.

2 pm: Speaker: T. Redin, William Demmler & Bros., *Blowing Green Sand Molds.*

2:45 pm: Speaker: L. Pridmore, International Molding Machine Co., *Blowing Cores.*

3:30 pm: Motion picture, *Core Blowing*, R. Sutter, Sutter Prods.

4:15 pm: Speaker: R. H. Zoller, Zoller Casting Co., *Unlined Cupolas and Operating Practice.*

5:30 pm: Social hour

6:30 pm: Steak dinner, entertainment
Presiding: J. W. Toth, Harry W. Dietert Co.

October 9, 1953

9 am: Speaker: A. E. Jacobson, Jr., Grand Haven Brass Foundry, *Plastic Core Dryers.*

9:45 am: Speaker: Charles Smith, Plastic Tool Co. of America, *Applications of phenolic, polyester and epoxy resins in pattern making.*

10:05 am: Speaker: Fred Hodgson, student, *Brief on an Experimental Plastic Pattern.*

10:15 am: Speaker: F. J. McDonald, Central Foundry Div., GMC, *Gating to Control Pouring Rate and its Effect on Casting.*

11 am: Speaker: Ted Operhall, Precision Casting Div., *Introduction to Precision Molding.*

11 am-2 pm: Special student session.
Chairman, H. A. Deane, Campbell, Wyant & Cannon.

11-11:10 am: Speaker: E. J. Walsh, F.E.F., *How F.E.F. Can Help Young Men.*

11:10-11:30 am: Speaker: C. J. Freund, University of Detroit, *How to Prepare For a Foundry Career.*

11:30 am-Noon: Discussion

Noon-1 pm: Luncheon

1-1:20 pm: Motion picture, *Technique for Tomorrow.*

1:20-1:40 pm: Speaker, Claude Jeeter, Ford Motor Co., *Young Men in the Foundry Industry.*

1:40-2 pm: Discussion

Noon: Luncheons for Non-ferrous, Gray Iron, and Malleable Iron groups, with round table discussions.

3 pm: AFS motion picture, *Gating Design.* Demonstration at Michigan State College foundry of equipment used in the film.

Ohio Regional

Foundrymen in the Ohio area are reminded that the Ohio Regional Conference is scheduled for September 24-25, 1953, and will be held at the Netherland Plaza Hotel, Cincinnati. "Engineered Castings" is the general theme.

William L. Oberhelman, Oberhelman-Ritter Foundry Co., Cincinnati, is general chairman, and Cincinnati, Northeastern Ohio, Central Ohio, Canton, and Toledo Chapters are participating.

Registration for the Conference begins on September 24 at 9 a.m.

Niagara Regional Program Taking Final Shape

THE program for the Niag ra Frontier Regional Conference is rapidly taking final form. This two-day meeting will be held at Buffalo's Statler Hotel, September 17-18. The Conference Chairman is Grant S. Diamond, Electro Refractories & Abrasives Corp., Buffalo; and Co-Chairmen are Carl A. Harmon, Hanna Furnace Corp.; and Henry Sproull, A. P. Green Firebrick Co., both of Buffalo.

With Western New York, Northwestern Pennsylvania, Rochester, Central New York, Eastern New York, and Ontario Chapters participating, the Conference has an international aspect.

September 17, 1953

8:30 am: Registration Opens

9:30-9:45 am: Welcoming Address—General Chairman and officers of participating chapters

9:45-11:30 am: Shell Molding Panel, "C" Process
Speaker—Bernard N. Ames, New York Naval Shipyard, Brooklyn, N.Y.

12:15-2 pm: Luncheon
Presiding—Henry Sproull, A. P. Green Firebrick Co., Buffalo, N. Y.
Guest speaker—F. J. Dost, National Vice-President, AFS
Technical Speaker—T. C. Barlow, Eastern Clay Products, Inc., Chicago, Ill.
Subject:—*"Pressure Molding"*

2:15-3:30 pm: Sectional meetings
Gray Iron—*"Factors that Influence Properties of Gray Cast Iron"*
Speaker—H. H. Wilder, Vanadium Corp. of America, Detroit.
Non-Ferrous—*"Some New Aluminum Bronze Developments"*
Speaker—J. S. Vanick, International Nickel Co., New York, N. Y.
Pattern Practice—*"Coordinative Function of Pattern Equipment and Castings"*
Speaker—A. F. Pfeiffer, Allis-Chalmers Co., Milwaukee, Wis.
Steel—*"The Factors Affecting the Quality of Cast Steel"*
Speaker—T. N. Armstrong, International Nickel Co., New York, N. Y.

3:45-5 pm. Sectional Meetings
Gray Iron—Subject and speaker to be announced.
Non-Ferrous—*"Non-Ferrous Castings"*
Speaker—H. F. Taylor, Massachusetts Institute of Technology, Cambridge, Mass.
Pattern Practice—*"Patterns for Malleable and Steel Foundries"*
Speaker—J. M. Kreiner, National Malleable & Steel Castings Co., Cleveland
Steel—*"Sand Reclamation in the Steel Foundry"*
Speaker—C. B. Jenni, General Steel Castings Co., Eddystone, Pa.

7 pm: Banquet
Presiding—Joseph M. Clifford, Host Chapter Chairman, Atlas Steel Castings Co., Buffalo, N. Y.
Introduction of Guest Speaker—Grant S. Diamond, Electro Refractories & Abrasive Corp., Buffalo, N.Y.
"Foundry People as They Come and Are"—Ralph L. Lee, Birmingham, Mich.

September 18, 1953

8:30 am: Registration opens

9-10 am: Educational session
Speaker—Otto Guenther, N. Y. State Institute of Applied Arts & Sciences, Buffalo, N. Y.

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G.I.F.S.—N.F.A. Plan Fall Meetings

Gray Iron Founder's Society

THE Gray Iron Founders' Society, Inc., will hold its 25th silver anniversary meeting at the Hotel Jefferson, St. Louis, on October 7-9, 1953.

Highlight of the three-day meeting will be an address by the Honorable Walter Williams, Under Secretary of Commerce, Washington, D. C., who will discuss the problems of small business and how the new federal administration expects to deal with them.

Another feature of this anniversary meeting will be a discussion panel of top-flight industrial leaders on modern foundry management techniques. Panel members are S. C. Massari, manager, Foundry Division, Hansell-Elcock Co., Chicago, chairman; James H. Smith, general manager, Central Foundry Division, General Motors Corp., Saginaw, Mich.; C. R. Culling, president, Carondelet Foundry Co., St. Louis; and T. W. Curry, director of manufacturing research, Lynchburg Foundry Co., Lynchburg, Va.

Other speakers on the program are W. S. Williams, works simplification director, Lynchburg Foundry Co., Lynchburg, Va.; Stuart Heinritz, editor, *Purchasing* magazine; and Tom Collins, Director of Public Relations, City National Bank, Kansas City, Mo.

Members of the meeting's Entertainment Committee are J. B. Frielingsdorf, chairman, Banner Iron Works; C. R. Culling, Carondelet Foundry Co.; Frank C. Hatten, Century Foundry Co.; W. E. Illig, Banner Iron Works; Paul Kluge, Tower Grove Foundry Division; George Mellow, Liberty Foundry Co.; Harry C. Sanders, American Foundry & Mfg. Co.; C. B. Shanley, Semi-Steel Casting Co., all of St. Louis, Mo.; and Ralph Hill, East St. Louis Castings Co., East St. Louis, Ill.

Wednesday, October 7, 1953

10 am—Meeting—Retiring and new board of directors

6 pm—President's reception and dinner.

Awarding of past president's pins.

Thursday, October 8, 1953

Business Program

H. J. Trenkamp, president, presiding.

8:00 am—Registration—members and guests

9:45 am—Business session

Report of the president—H. J. Trenkamp

Report of the treasurer—W. O. Larson

Report of the executive vice president—Donald H. Workman

Report of the technical director—Charles O. Burgess

Presentation of Committee Reports

11:15 am—Keynote address (Speaker and subject to be announced later)

12 Noon—reception

12:30 pm—Industry luncheon

Presentation of retiring board of directors

Speaker: The Honorable Walter Williams, Under Secretary of Commerce U. S. Department of Commerce, Washington, D .C.

Subject: (to be announced later)

2:30 pm—Business session

Panel subject: "Management Techniques"

Chairman: S. C. Massari, manager, Foundry Division, Hansell-Elcock Co. Chicago, Ill.

Panel Speakers: James H. Smith, general manager, Central Foundry Div., General Corp., Saginaw, Mich.

Subject: "Management Technique in the Foundry Industry"

C. R. Culling, president, Carondelet Foundry Co., St. Louis, Mo.

Subject: "Management Yardsticks."

T. W. Curry, director of manufacturing research, Lynchburg Foundry Co., Lynchburg, Va.

Subject: "An Economic Evaluation of Shell Molding"

Followed by formal question and answer period.

4:15 pm—G. I. F. S. committee meetings

5:30 pm—Social hour

6:30 pm—Industry banquet—informal

Friday, October 9, 1953

9 am—Registration

9:15 am—Business session

Speaker: W. S. Williams, work simplification director, Lynchburg Foundry Co., Lynchburg, Va.

Subject: "Work Simplification in the Foundry"

continued on page 96

National Foundry Association

THE National Foundry Association will hold its 55th annual meeting at the Plaza Hotel in New York City on September 17 and 18. The program of the two-day convention has been designed, and the speakers selected, to further the objectives of the N.F.A. Formed originally in 1898, the National Foundry Association has served foundry management through the years as industry spokesman in national affairs, as a clearing house of information on wage and labor agreement data, and as a counselor in the field of industrial relations and all management fields other than technical.

The business meeting on September 17 will be opened by President Brunk's report on the association's activities and accomplishments during the past year. President Brunk will be followed by an authority on industrial hygiene and air pollution, a prominent economist, an industrial marketing specialist and a leader in the field of incentive management. The day's business session will come to a close with the report of the Resolutions Committee and installation of officers. In the evening a reception and cocktail party to which all in attendance are invited will be given in honor of the new officers.

Friday, September 19 will be set aside for a labor-management panel discussion and open forum. The panel will consist of an experienced arbitrator, qualified management spokesmen, and high-ranking union leaders. J. Noble Braden, executive vice-president of the American Arbitration Association, will conduct the forum as moderator. Management representatives will be Paul Arnold, resident manager, United States Pipe and Foundry Co. and Harry Kelly, Director of Industrial Relations, American Seating Co. Labor spokesmen are Harry Southwell, president, Local 174, CIO-United Auto Workers; and David Feller, assistant general counsel, CIO-Steelworkers. The panel will discuss President Eisenhower's suggested changes in the Taft-Hartley law and critical issues now coming to the bargaining table. This panel will afford foundry management an unusual opportunity to

continued on page 96

Why does the SPEEDMULLOR Use Less Power?

A 125 horsepower motor (in the 80A Speedmullor) operated for one minute, consumes far fewer *K.W.H.* than a 75 horsepower motor operated for three or more minutes. Because the Speedmullor thoroughly mulls molding and core sands to *maximum physical properties in less than one-third the time* required in a conventional mixer, it uses fewer K.W.H. of electrical power per ton of sand. Electric bills are based on K.W.H. . . . you pay for K.W.H. and not horsepower. Your costs are determined by K.W.H. per ton of sand mulled.

Modern high speed mulling pays off in capacity too. The 80A Speedmullor *fully mulls* more sand per hour than any other mill.

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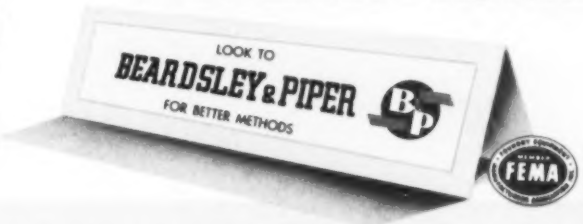
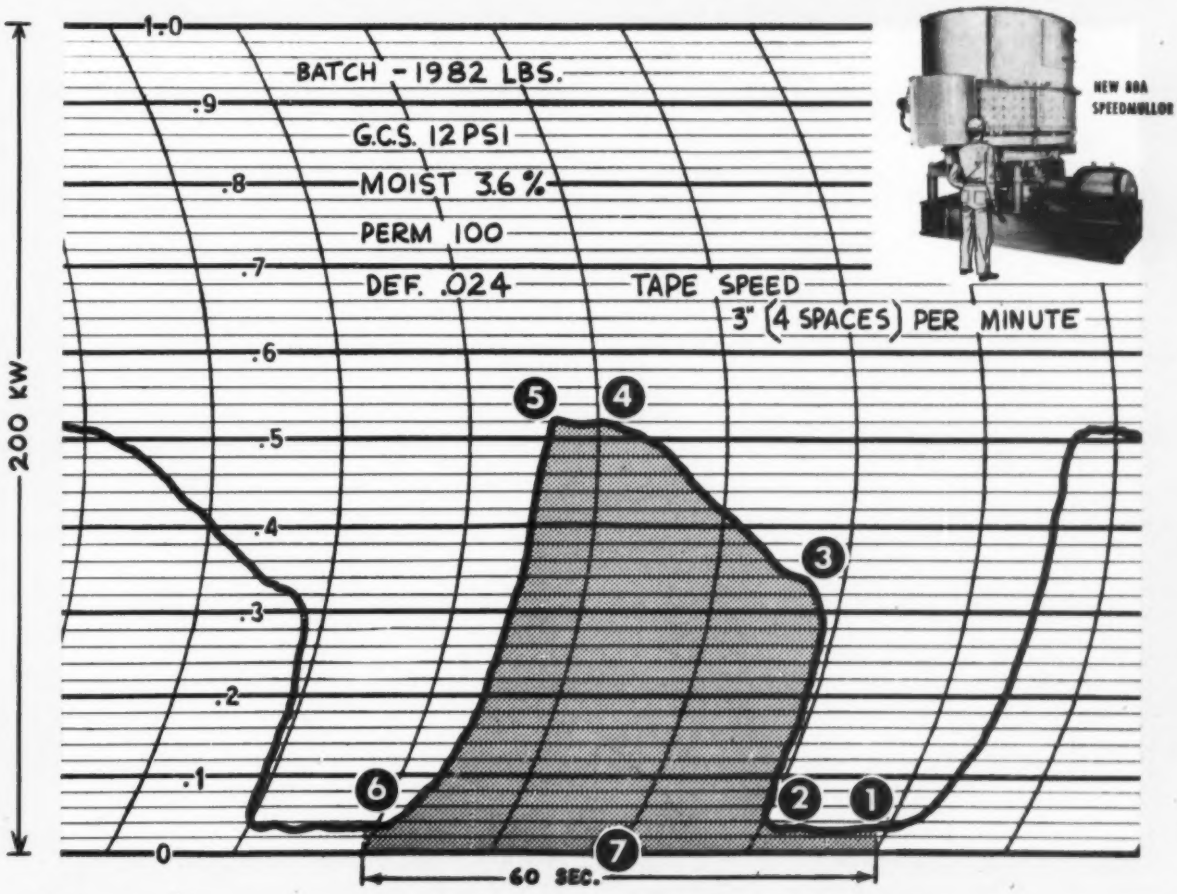


AN ACTUAL POWER GRAPH RECORD OF A 1982 LB. BATCH OF MOLDING SAND MULLED IN AN 80A SPEEDMULLOR.



1. Flush water is introduced.
2. Batch of sand and bonding additions charged.
3. "Temper water is added and strength starts developing.
4. The maximum physical properties are attained after 45 seconds . . . green compressive strength—12 p.s.i.
5. Batch is discharged after 51 seconds.
6. Discharge complete in 9 seconds (⅓ to ½ the time required by conventional muller).
7. Total elapsed cycle time—60 seconds . . . average horsepower for cycle—81.66 . . . total power consumed—1.02 K.W.H. to fully mull 1982 lb. batch.

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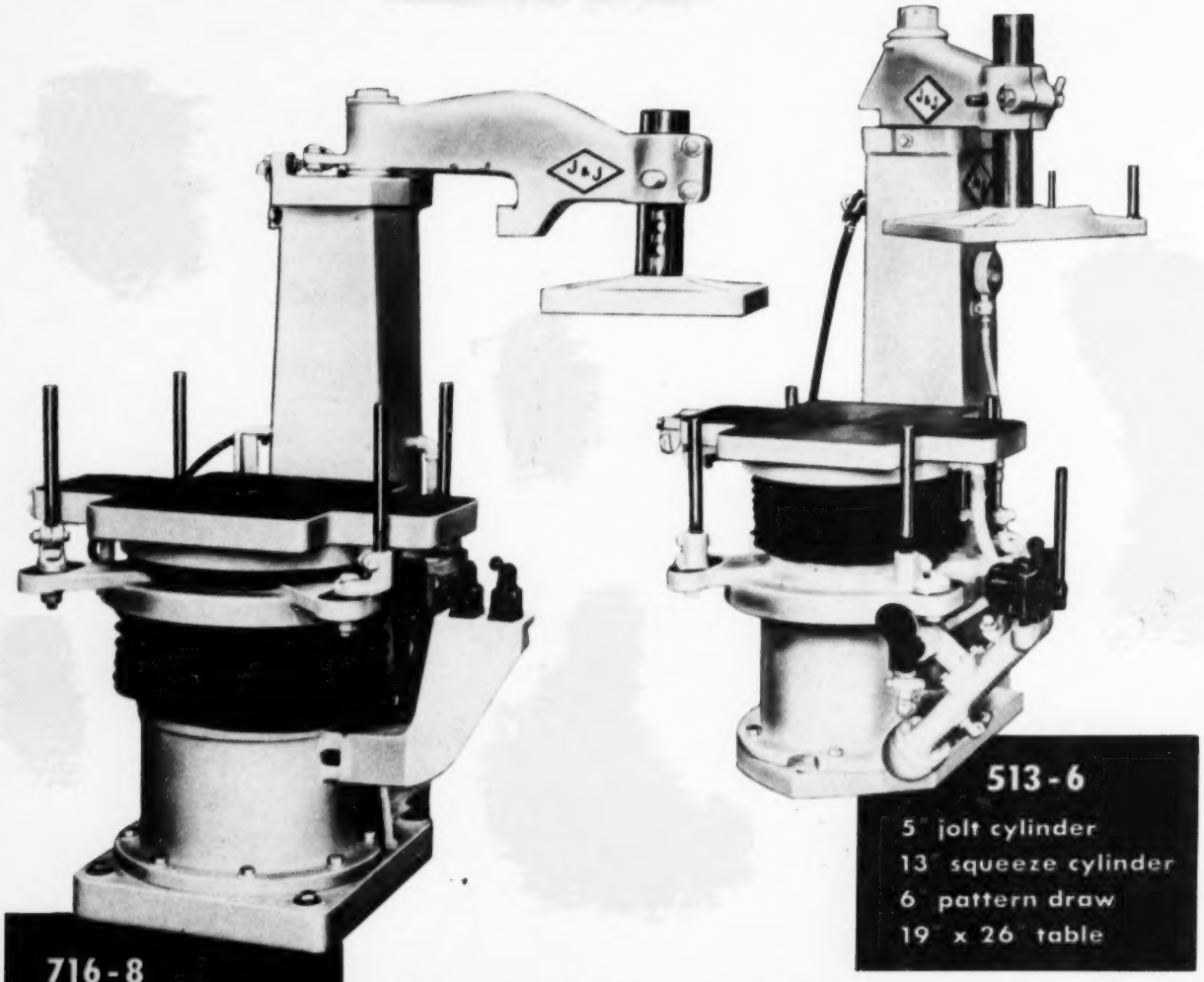
JOLT SQUEEZE PIN-LIFT Machines

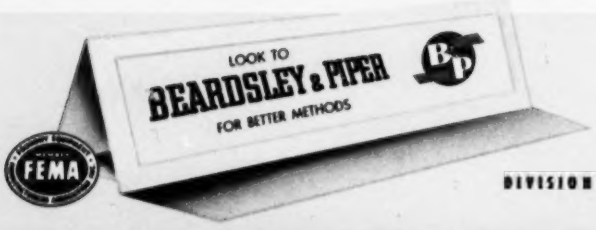


716-8
7" jolt cylinder
16" squeeze cylinder
8" pattern draw
24" x 34" table

513-6
5" jolt cylinder
13" squeeze cylinder
6" pattern draw
19" x 26" table

Brand new in design and featuring an exclusive concentric draw cylinder guided by a full-circle bearing area around the large squeeze cylinder, the J&J 513-6 and 716-8 offer the most accurate draw obtainable with this type of machine.

Internal guides are hardened and ground to assure retained accuracy of draw. The jolt of the 513-6 is knee-valve-controlled, while a single hand-valve controls both squeeze and draw. Two convenient pilot valves control all operations on the 716-8. Both machines feature positive, controlled slow and fast draw on the same stroke, with automatic vibrator control.



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Chapter News

Corn Belt Chapter

VERNON J. HOLMES
Paxton-Mitchell Co.

Approximately half of the membership of the Corn Belt Chapter met at Capitol Beach, Lincoln, Neb., to enjoy their first Annual Stag.

Joe M. Buckholtz, Dempster Mill Mfg. Co., won the Dart Contest and Charles Burgess, Cushman Motor Works, placed second. Harold Hanson and Orville Dethlef, both of Paxton-Mitchell Co., finished first and second respectively in the Robin Hood Handicap. Mr. Dethlef was also high man in the Archery Contest held aboard the bus taking the members from Omaha.

The Lincoln members, headed by Leo Hill, Northwestern Metal Co., acted as hosts, and despite the rain, put over a successful outing.

Tri-State Chapter

EDWARD W. O'BRIEN
Oklahoma Steel Castings Co.

The Tri-State Chapter held its first board meeting for the coming year in July. Officers attending were: D. W. Harris, Frank Wheatley Pump & Valve Mfg. Co., chairman; D. W. McArthur, Oklahoma Steel Castings Co., vice-chairman; W. H. Mook, Bethlehem Supply Co., secretary; R. F. Forsythe, Big Four Foundry Co., treasurer; J. G. Winget, Reda Pump Co., director; Jackson A. Dean, Nelson Electric Mfg. Co., director, and C. C. Beagle, Webb Corp., past chairman.

Discussion was primarily directed at determination of the most desirable location for meetings for the coming year. Dates and cities favored were: Sept. 18, Tulsa, Okla.; Oct. 16, Joplin, Mo.; Nov. 13, Blackwell, Okla.; Dec. 11, Christmas Party, Tulsa, Okla.; Jan. 15, Tulsa, Okla.; Feb. 12, Oklahoma City, Okla.; March 12, Bartlesville, Okla.; April 16, Tulsa, Okla., and May 14, Tulsa, Okla.

Phillip V. Spooner, Missouri Steel Castings Co., was selected acting program chairman for the Joplin meeting. For the Oklahoma City meeting, R. G. Williams, Cities Service Oil Co., was selected acting program chairman. J. G. Winget, Reda Pump Co., was selected acting program chairman for the Bartlesville meeting and Charles M. Diel, Acme Foundry & Machine Co., was selected acting program chairman for the Blackwell meeting.

Frank C. Cech, retiring chairman of the Northeastern Ohio Chapter, left, and L. P. Robinson, relaxing at the chapters annual outing.

Mo-Kan Chapter

Wm. N. Chivvis, new chairman of the Mo-Kan Chapter, announces the following additional appointments: C. W. Boettcher, Black, Sivalls, & Bryson, publicity chairman and Alan G. Linley, Locomotive Finished Material Co., education chairman.

Part of the crowd waiting for prizes to be distributed at the annual outing of the Northeastern Ohio Chapter held at Twin Lakes Country Club.

Al Jacobsen, Sr., left, chairman of the D. J. Campbell Scholarship Fund, receiving a $500 check for the fund from the Western Michigan Chapter. W. J Cannon, retiring chairman of the chapter is making the presentation.

Michael C. Ross, left, Bellville Foundries, Inc., and Henry J. Trenkamp, Ohio Foundry Co., shown at the Annual Outing of the Northeastern Ohio Chapter, held at Twin Lakes Country Club.

W. J. Cannon, right, Nugent Sand Co., Muskegon, Mich., receiving retiring chairman award from F. J. De Hudy, Centrifugal Foundry Co., Muskegon, Mich., new chairman of the Western Michigan Chapter.

AFS Officers

National Officers

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Albion Malleable Iron Co., Albion, Mich.

VICE-PRESIDENT

***Frank J. Dost**
Sterling Foundry Co., Wellington, Ohio

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M. J. O'Brien, Jr.
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Andrew M. Ondreyco
General Metals Corp., Oakland, Calif.

***I. R. Wagner**
Electric Steel Casting Co., Indianapolis

**Member, Executive Committee*

Term Expires 1955

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J. O. Klein
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A. D. Matheson
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Term Expires 1956

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Martin J. Lefler
Oliver Corp., South Bend, Ind.

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Jos. E. Foster, *Technical Assistant*

C. R. McNeill, *Technical Assistant*

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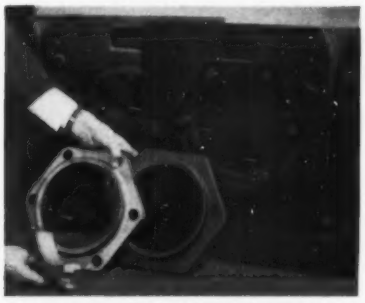
Casting with shell molds at Lynchburg Foundry Co., Lynchburg, Va.



Better surface finish, increased metal yield and up to 100% elimination of machining costs are advantages gained through shell molding.

Better Castings for Less Money...

With Shell Molds Bonded with Resinox

One of the reasons behind the trend toward shell molding in the nation's leading foundries is that productivity per square foot of floor space can be increased several times over other casting techniques.

Shell molding reduces sand handling costs since 90-95% less sand is used. This means less sand handling equipment; a more compact, efficient operation; greater production per man hour with unskilled help.

The latest practical information on this new foundry method is now available in a new Monsanto bulletin which explains how Resinox shell molding resin can give you metal parts with greater uniformity, fewer defects, and more accurate dimensions at lower cost. Write for it today.

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Abstracts

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■ A310. "Some Industrial Applications of Microradiography," S. Goldspiel and F. Bernstein, Nondestructive Testing, vol. 11, no. 5, May 1953, pp. 15-20.

Microradiography is a test method in which a relatively small volume of the object is radiographed in a fine grained emulsion which is enlarged for final inspection and interpretation. As an illustration, the application of microradiography in the foundry to gun metal is described, with particular reference to the study of the effect of super-heating and the casting temperature on the physical properties and solidification characteristics. Both photomicrographs and microradiographs are shown for comparison.

■ A311. "The Place of Shell Molding as a Precision Casting Method," R. A. Kempe, Precision Metal Molding, vol. 11, no. 5, May 1953, pp. 30-31, 71-73.

The primary advantages of the shell molding process are dimensional reproducibility (tolerances of ± 0.005 in. per in. can be maintained) and the high quality of surface finish obtainable. The shell process is capable of handling all of the normally castable alloys. The primary disadvantage of the process is its relatively high cost.

■ A312. "Technical and Economical Aspects of the Uses and the Production of Foundry Coke," H. Wubbenhorst, Giesserei, vol. 40, no. 10, May 14, 1953, pp. 258-262 (in German).

The important savings in coke consumption realized in foundry work in the last few years are due not only to the introduction of new methods, such as hot blast, but to a more rational discrimination in the choice of the appropriate coke. Cokes from coals of moderate gas content are the most suitable for foundry work. The water and ash contents of the coke are less important factors than such physical properties as the brittleness, which affects the use of optimal size of coke pieces in the furnace.

■ A313. "Oxygen Enrichment and Pre-Heating of the Blast in Cupola Work. Ultimo Severi," La Fonderia Italiana, vol. 2, no. 4, April 1953, pp. 379-387 (in Italian).

The author finds a general agreement between theoretical considerations and experimental data on the advantages of oxygen blasts and preheated blasts in cupola operation. Both factors considerably increase the temperature of the metal and the velocity of the melting process. However, there exists a significant difference in the effect of the two procedures on the quantity of coke consumed. While a 30-40 per cent saving in coke consumption can be realized by pre-heating the blast to 500 C, no appreciable savings can be obtained by using pure oxygen blasts.

■ A314. "Methods of Compound Casting of Copper-Lead Bearings," H. Mann, Giesserei, vol. 40, no. 11, May 28, 1953, pp. 277-290 (in German).

The various stages in the development and the present state of the fabrication of copper-lead lined steel bearings in Germany are outlined. The main effort of the German researchers was made during the last war, with a view to developing methods similar to those already known in the U. S. The dipping method, the stationary-mold methods (with flame or induction heating), and centrifugal casting in the form adopted by leading German manufacturers are described. Other procedures, developed in America, but not yet used in Germany, are outlined, viz., the continuous fabrication of copperlead covered steel bands and the modern sintering methods.

■ A315. "A Study of Cupola Losses in Cold-blast and Hot-blast Cupolas," Gl. Clas and J. Schleissner, Giesserei, vol. 40, no. 8, April 16, 1953, pp. 190-193 (in German).

The change from cold blast to hot blast in a plant necessitated a determination of changes in costs due primarily to modified conditions of slag formation. A comparison was made between the cupola losses in both cases as reflected in the decrease or increase of S, P, Mn, Si and C contents with respect to the composition of the scrap iron smelted. In one installation the above contents (in percentage) were:

	In Scrap	In Product	
		COLD BLAST	HOT BLAST
C	4.02	3.70	3.83
Si	2.56	2.34	2.65
Mn	0.29	0.22	0.36
P	0.06	0.08	0.11
S	0.030	0.076	0.063

The operational costs, due both to cupola losses and the coke consumption, were calculated as a function of the CO_2 content in the gases.

The largest steel casting ever poured in Canada was recently shipped from Dominion Foundries and Steel Ltd., Hamilton, Ont., where it was poured, to Dominion Engineering Works, Ltd., Montreal. The casting will become one of two housings for the latter firm's new mill. The casting, as shipped, weighed 179,680 lb, was over 24 ft long, almost 12 ft wide, and 5 ft in height. Approximately 300,000 lb of metal was poured in three open hearth furnace heats, tapped almost simultaneously. Six weeks of steady work were required to make the mold.

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Black Hills 80. Granular; produced to the lowest possible dust level to eliminate loss at the muller. For maximum efficiency with systems which include fines-removal equipment.

Black Hills Slurry Grade. Coarser than our 80-fineness grade; recommended for rapid dispersion and maximum efficiency in water when clay is added to sand as a slurry.

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Foundry Tradenews

Eutectic Welding Alloys Corp., Flushing, N. Y., recently held a cocktail party in Toronto to inaugurate the formation of their new Canadian company and to introduce Canadian personnel. Eutectic announced its intention "to manufacture products in Canada from Canadian raw materials." The company has also started construction on its No. 3 plant at Flushing. The new plant has been designed for high speed production of the new type of electrodes recently developed by the company.

Cleveland Metal Abrasive Co., Cleveland, has opened a new division for the production of cut wire shot. The new facility which is located at Northfield, Ohio, will be known as the Cut Wire Div. and will double the company's production of this particular abrasive material.

Brown Chemicals, 15 Moore St., New York, has joined with Swan-Finch Co., and is now being operated as the Swan-Finch Chemicals Div. The new address is 205 East 42nd St.

Lister Blackstone Pty. Ltd. has completed its new plant in Sydney. The works, which has been in construction four years, is probably the most highly mechanized foundry in Australia. Designers of the building and plant were given scope for the use of the most modern and up to date ideas. The main laboratory as well as the rest of the works is equipped with the most recent developments in equipment and scientific apparatus.

Lynchburg Foundry Co. has completed one phase of an expansion and improvement program at its Radford (Va.) Plant. The plant which manufactures castings ranging from 500 lbs to 50 tons has provided for additional production of large, precision castings. Increased space has relieved much congestion in the foundry and has provided better conditions for operations in all phases of core production.

Certified Alloys Co., Bedford, Ohio, has completed an expansion program which increased production capacity 40 per cent. The fireproof one-story addition to the main plant has been equipped with a new 40,000 lb reverberatory and modern automatic pigging equipment. The furnaces are serviced by automatic pouring ladles and mechanized ingot conveyors. Quality is controlled and checked by modern testing equipment.

Dodge Manufacturing Co., Mishawaka, Ind., producer of power transmission machinery, recently commemorated its 75th anniversary with an open house attended by more than 3,200 guests. The city of Mishawaka sponsored a civic testimonial luncheon at which a bronze plaque was presented to J. E. Otis, Jr., president of the firm. From an original capitalization of $50,000 in 1878, the company has grown to a current net worth of more than $5.5 million.

Associated Metals Co. of California is the new combined name for **Associated Iron & Metal Co.** and **Associated Smelting Co.,** Oakland, Calif. The two units have operated for years with divisional status but consolidation has been decided upon to eliminate confusion. The new name is effective Aug. 1, 1953.

Lindgren Foundry, Batavia, Ill., reports a serious fire during the last week of July. An estimated $2 million worth of patterns were destroyed.

Pangborn Corp., Hagerstown, Md., has announced the 1953-54 appointments to its advisory council. Drawing its membership from both salaried and hourly paid employees, the council was formed in 1948 to give Pangborn employees an insight into the problems and accomplishments of management. It has served for five years to promote better understanding between management and labor.

American Monorail Co., Cleveland, has established four divisional sales offices, as follows: Eastern division, Philadelphia, W. P. Conway manager; Cleveland division, Frank L. Bateman, manager; Detroit division, C. L. Fell, manager; and Chicago division, C. E. Barner, manager.

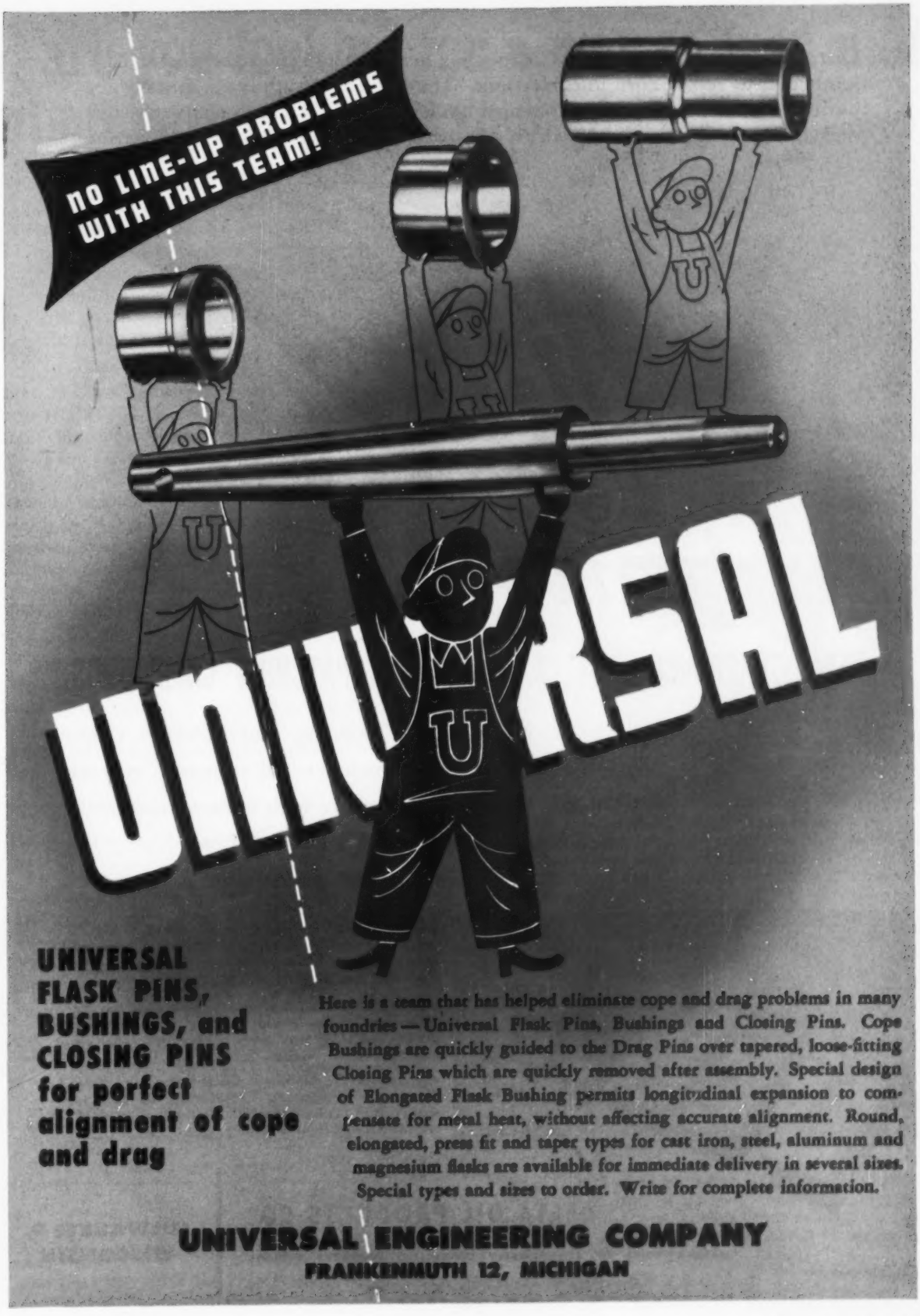
Oswald Refractories Co. of St. Louis has recetnly announced its appointment by **Vesuvius Crucible Co.** as its southwestern representative for graphite and carbon bonded crucibles, graphite stopper heads and other special graphite refractories.

Chain Belt Co. has opened a new Philadelphia warehouse to better serve the New England and Middle Atlantic states with its line of power transmission and conveying equipment. The recently completed warehouse building, occupying 15,000 sq ft also houses the company's Philadelphia district sales office.

Goehringer Foundry Supply Co. has purchased the entire business of **Foundry Devices, Inc.,** of Newton, Ohio. All equipment and patterns have been moved to Goehringer's new plant.

Nordic Ware products are being made by the Dalquist brothers in Minneapolis, who are manufacturing foundry production tools. They began in 1946 with $350 capital, operating in a basement. Production now tops $300,000 annually.

Filling of molds with molten metal was an operation that attracted much visitor interest during open house of Dodge Mfg. Corp., Mishawaka, Ind. Foundry visitors watch molds, formed by sand-slinger machine in right foreground, being filled with metal poured from huge ladle.



UNIVERSAL FLASK PINS, BUSHINGS, and CLOSING PINS for perfect alignment of cope and drag

Here is a team that has helped eliminate cope and drag problems in many foundries — Universal Flask Pins, Bushings and Closing Pins. Cope Bushings are quickly guided to the Drag Pins over tapered, loose-fitting Closing Pins which are quickly removed after assembly. Special design of Elongated Flask Bushing permits longitudinal expansion to compensate for metal heat, without affecting accurate alignment. Round, elongated, press fit and taper types for cast iron, steel, aluminum and magnesium flasks are available for immediate delivery in several sizes. Special types and sizes to order. Write for complete information.

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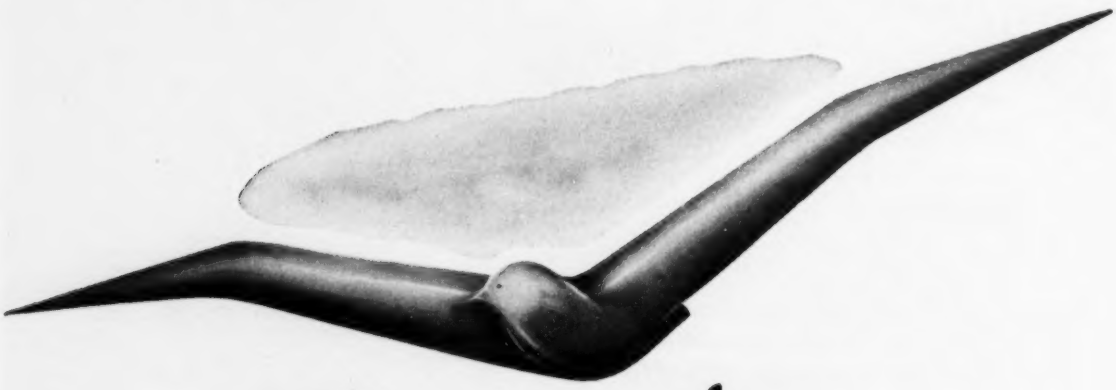
Delta Mudding and Patching Compounds are used to eliminate fins at core joints and to repair core imperfections. They are easy to apply . . . quickly . . . uniformly . . . smoothly. Due to their high hot and dry strength characteristics they form a complete bond which eliminates the danger of gas leakage at core joints.



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The new DELTA Mudding and Patching Compounds are faster, smoother and extremely easy to use. They are non-reactive with molten metal, will not expand or contract when dried, are highly refractory and have a high fusion point.

DELTA SLIKTITE — is a clean, smooth, ready to use plastic-type Mudding and Patching Compound for use on cores in the production of steel, gray iron, malleable and non-ferrous castings.

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Ask for working samples of the new, improved Delta Mudding and Patching Compounds. Be sure to specify SLIKTITE or EBONY. You will also receive complete instructions for use.

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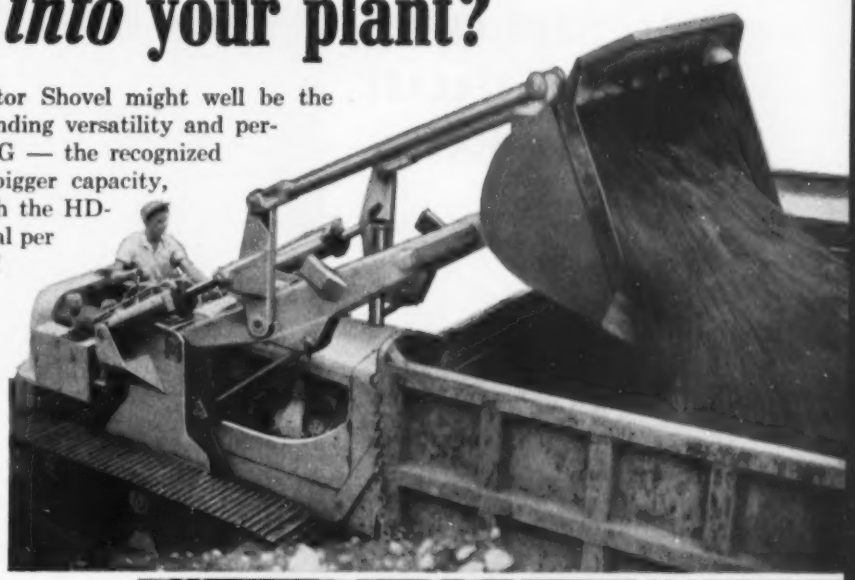
are you looking for a way to feed more output capacity *into* your plant?

This Allis-Chalmers HD-9G Tractor Shovel might well be the answer. It offers the same outstanding versatility and performing ability as the 1-yd. HD-5G — the recognized standard of comparison — *plus* bigger capacity, higher reach and more power. With the HD-9G, one man can move more material per shift . . . handle a wider variety of jobs inside and out.

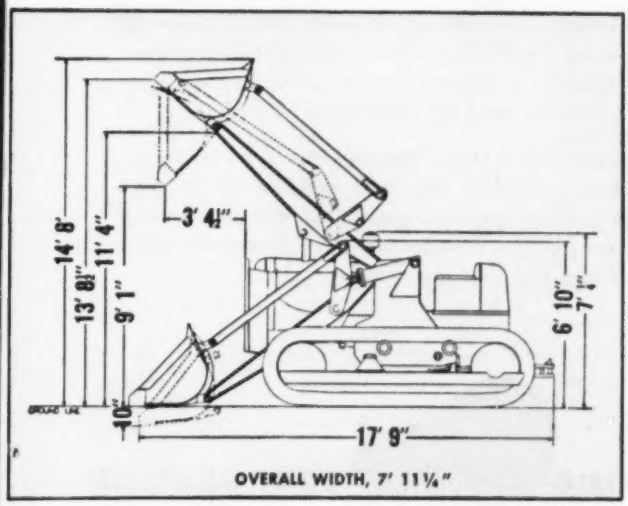


loads fast with big two-yard bucket

The HD-9G digs, stockpiles, loads trucks, feeds hoppers — handles any bulk material two big yards at a scoop. Special 3½-yd. light materials bucket almost doubles output in materials weighing not more than 1400 lb. per cu. yd. Exclusive Allis-Chalmers shift pattern further speeds loading by allowing operator to go from low forward to fast reverse with one simple gear shift.

high dumping height — 11 ft. 4 in. Under Bucket Hinge

Here is a Tractor Shovel that reaches for extra jobs. With bucket fully raised, it dumps into high bins. Also, tractor can work right up on storage piles, making it possible to put many more yards of material in a given area.



works in close quarters — No Bulky Superstructure

Compact design, plus the ability to turn in its own track length enables the HD-9G to work in confined areas or where there is little more than tractor-height head room.

powerful — 72 drawbar hp.

The HD-9G has the power, weight and traction to handle tough excavating on new construction, maintain yard roads and parking lots, spot railroad cars, lift, carry, push or pull heavy loads of all kinds.

Ask your Allis-Chalmers Dealer to show you the many ways this HD-9G has helped others step up production.

ALLIS-CHALMERS

TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

Mr. G. L. Bachner shows how Dow Corning 8 Emulsion is applied in the Bachner Die-Molding Machine in use at the Powdered Metal Products Co. of Franklin Park, Illinois. The rest of the molding cycle is push-button controlled. Automatically regulated cartridge type resistance heaters in the pattern shoe and a half-cylinder infrared traveling oven are special features of this new shell molding machine. Capacity is in the range of twenty 12" x 18" shell molds per hour.

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.... the NEW Silicone Parting Agent that makes fast, accurate low cost mold and core production practical

For consistently accurate shell mold production at low cost, try spraying your pattern plates with Dow Corning 8 Emulsion diluted with water. More effective at lower concentrations in hard or soft water than any previous parting agents, Dow Corning 8 Emulsion gives even less build-up on pattern surfaces. Dimensional accuracy is retained through longer runs and your pattern cleaning and maintenance costs are substantially reduced.

And this new silicone release agent is now available at a price 8% below that of the earlier silicone emulsions. Especially designed for the shell process, Dow Corning 8 Emulsion costs less, goes further and gives positive release from even the most complex patterns. For more information and a free trial sample, fill in and mail this coupon today.

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ELECTROMET Data Sheet

A Digest of the Production, Properties, and Uses of Steels and Other Metals

Published by Electro Metallurgical Company, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y. • In Canada: Electro Metallurgical Company of Canada, Limited, Welland, Ontario

New Foundry Alloy Neutralizes Effect Of Varying Section in Gray Cast Iron

Low-Carbon Foundry Ferrochrome is a new silicon-chromium alloy specially developed by ELECTROMET for the alloying of cast iron. It is so balanced in composition that it increases the strength and Brinell hardness of gray iron, as well as its resistance to wear and corrosion, without increasing the chilling tendency of the metal.

The alloy has a nominal analysis of 50 per cent chromium and 30 per cent silicon. It has excellent solubility in iron, and the inoculating effect of the silicon content makes it possible to add up to 1 per cent chromium to gray iron as a ladle addition, with no appreciable increase in chill depth. Light-section castings, such as automobile and truck exhaust manifolds and stove parts, may easily be produced in 1 per cent chromium iron by a simple ladle addition of the alloy to any base iron that would be suitable for casting the same parts in unalloyed iron.

Effect on Chill Depth

Fig. 1 illustrates how chill depth was affected by varying additions of the new alloy to a commercial cupola iron analyzing 3.24 per cent carbon and 2.12 per cent silicon, with 0.12 per cent residual chromium. A chill depth of approximately ¼ of an inch was obtained in all of these typical hatchet-type chill-test specimens.

Effect on Mechanical Properties

Although Low-Carbon Foundry Ferrochrome was especially developed for decreasing the section sensitivity of gray iron castings, it is also useful in obtaining moderate increases in the strength of gray iron, when used alone or in combination with the alloys nickel, molybdenum, or vanadium. An unalloyed base iron, analyzing 3.43 per cent carbon and 1.95 per cent silicon, was treated with additions of 0.36 per cent and 0.84 per cent chromium. The following table gives the complete analyses of the irons. It shows how both Brinell hardness and tensile strength were improved by the alloying additions.

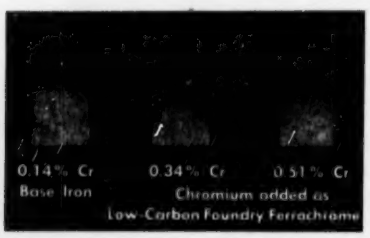


Fig. 1. These fractures of broken chill specimens show the effect on chill of chromium additions made with Low-Carbon Foundry Ferrochrome.

Analyses	Brinell Hardness	Tensile Strength
3.43 % total carbon, 1.95% Si, 0.05% Cr.	202	31,000
3.41% total carbon, 2.20% Si, 0.36% Cr.	217	35,400
3.32% total carbon, 2.56% Si, 0.84% Cr.	228	36,100

Auto Cylinder Castings

Addition of chromium to cast iron in the form of Low-Carbon Foundry Ferrochrome tends to stabilize the pearlitic structure of the iron, and to eliminate areas of soft secondary ferrite in slowly cooled sections. Moreover, the alloy helps avoid difficulties with chilled corners or edges in thin sections. It is therefore particularly well suited for producing a cylinder-type iron with consistently good structure and improved uniformity of hardness in sections exposed to widely varying cooling rates.

An example of the usefulness of this alloy is illustrated in Fig. 2, which shows strips cut from the bores of three automotive cylinder blocks. The base iron used in these castings was a typical unalloyed cylinder grade of cast iron, analyzing 3.38 per cent total carbon, 2.07 per cent silicon, and 0.08 per cent residual chromium.

The design of these castings was such that a heavy boss close to the cylinder bore caused slow cooling along one side, resulting in a soft area and wide variation in hardness along the length and around the perimeter of the unalloyed cylinder.

The strips illustrated in Fig. 2 were cut from the soft side of the cylinder bore. When subjected to a Rockwell B hardness exploration, casting No. 1 showed a variation in hardness from 92.2 to 80.2 Rockwell B (196 to 150 Brinell*). Casting No. 2 showed a variation from 94.0 to 90.8 Rockwell B (205 to 189 Brinell). Casting No. 3 showed a variation from 95.5 to 90.3 Rockwell B (213 to 187 Brinell).

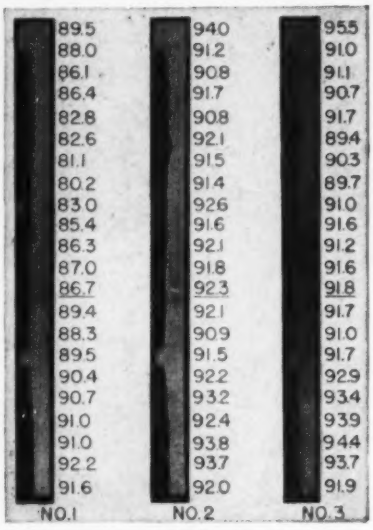


Fig. 2. Average Rockwell B hardness values at indicated positions in strip specimens from the bores of three cylinder block castings. No. 1-Untreated base iron containing 0.08% chromium. No. 2-Treated with 0.31% chromium added as Low-Carbon Foundry Ferrochrome. No. 3-Treated with 0.44% chromium added as Low-Carbon Foundry Ferrochrome.

The small chromium additions made in cylinders Nos. 2 and 3 had a marked effect in reducing the hardness spread and also in stabilizing the desired pearlitic structure in critical areas of the cylinder bore. This provided satisfactory resistance to wear in spite of difficulties introduced by an admittedly difficult design. Similar problems exist in most iron foundries—problems that Low-Carbon Foundry Ferrochrome can help solve with a minimum change in melting practice and at a very reasonable cost.

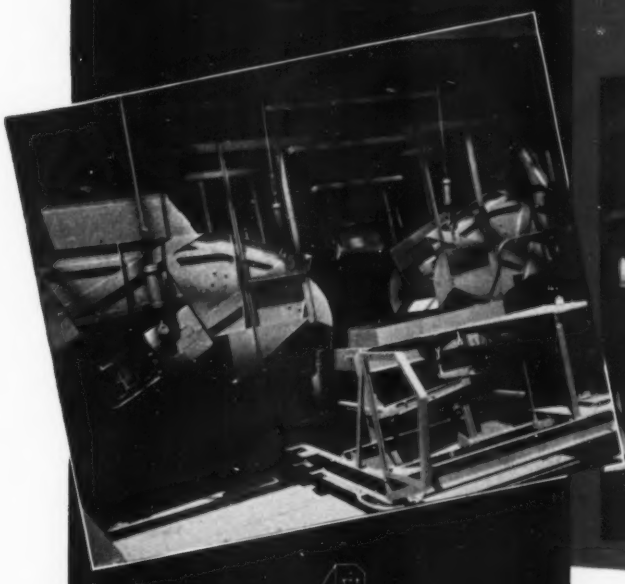
Booklets Available

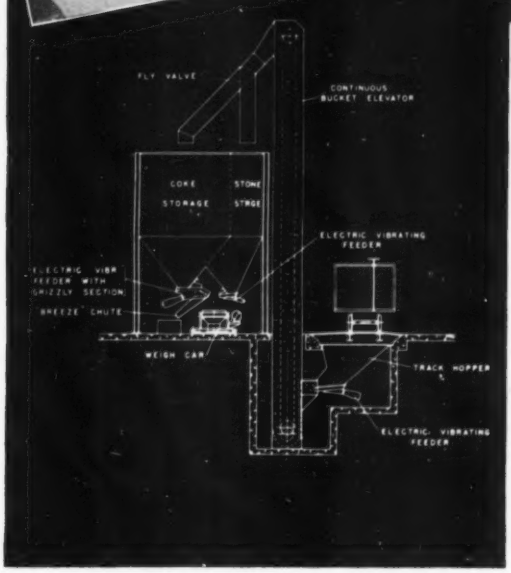
Further information about this new ferrochrome is given in the booklets, "New Chromium Alloy Neutralizes Effect of Varying Cooling Rate in Gray Iron" and "Silicon-Chromium Alloy in Complicated Iron Castings." You may obtain copies, free of charge, by writing or phoning to the nearest ELECTROMET office: in Birmingham, Chicago, Cleveland, Detroit, Los Angeles, New York, Pittsburgh, or San Francisco. In Canada: Welland, Ontario.

*All Brinell hardness values were obtained by conversion from Rockwell B.

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation.

COKE AND LIMESTONE UNLOADING and HANDLING





The illustrations above show how Jeffrey Electric Vibrating Feeders are used for controlling feed in coke and limestone handling operations. The pan feeders control feed to bucket elevator and to draw off coke and stone from storage bins. The grizzly feeder eliminates coke "breeze" in charge.

Study the drawing. It shows a typical system with both coke and stone being handled by one continuous-type bucket elevator.

Single units or complete systems are available as well as sound advice and help through experienced foundry engineers. Our Foundry Catalog No. 845 will be sent along on request.

THE JEFFREY MANUFACTURING CO.

ESTABLISHED 1877

Columbus 16, Ohio

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IF IT'S MINED, PROCESSED OR MOVED

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Mr. E. A. Hartman
FOUNDRY SUPT. OF

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SAYS:

"The Royer SAND HOG is indispensable"

"ELIMINATES 10 MAN-HOURS PER DAY!"

The SAND HOG, the Royer completely mechanized, self propelled, self loading sand conditioner has been in operation at the Pangborn Corp., Hagerstown, Md., for a full year. E. A. Hartman, Foundry Superintendant, says that "we consider it indispensable; we would not be without it." Formerly the 5-man night crew required 9½ to 10 hours to condition their sand. With the SAND HOG the same job is completed in 7 to 7½ hours. Not only has Pangborn eliminated a minimum of 10 hours of labor time per day but the night crew has time to do a more complete job of preparing the floors for the next day's operation.

Even more important to Pangborn, leader in the field of Blast Cleaning and Dust Control equipment, is the improvement in its already high quality castings and the big reduction in casting rejects. This is due chiefly to the removal of tramp iron and all contamination from the sand. Supt. Hartman further says that they are completely satisfied with the operation of the SAND HOG and believes the maintenance required is less than on former equipment.

Why don't you investigate the possibilities for this completely mechanized, easily maneuverable machine in *your* foundry? This hydraulically powered unit, operated by one man, eliminates costly sand handling and hauling and prepares from 40 to 60 tons per hour. Write for details.

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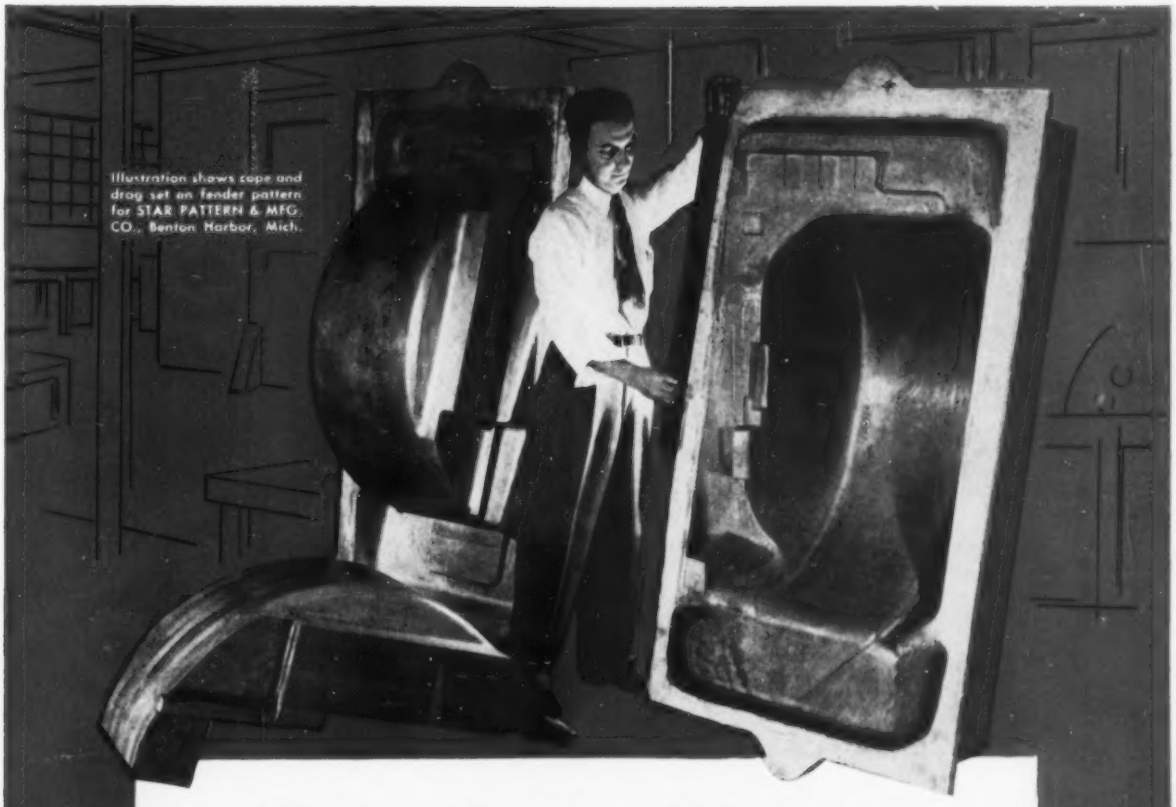

Illustration shows cope and drag set on fender pattern for STAR PATTERN & MFG. CO., Benton Harbor, Mich.

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look to **ACCURATE** cope and drag sets

Because they have been a profit maker for several hundred of the leading foundries all over America...

For example, when you use Accurate cope and drag sets you get clean smooth partings. Patterns as cast are straightened and have correct alignment marks. This helps to decrease your finishing costs.

Maintenance costs are much lower because you get longer life.

Wherever used, Accurate cope and drag sets have been the means of producing greater volume of castings at lower costs.

Why not apply this idea to your foundry? It has been profitable to others and will be to you, too.

Write for catalog No. 115. It tells the whole story.

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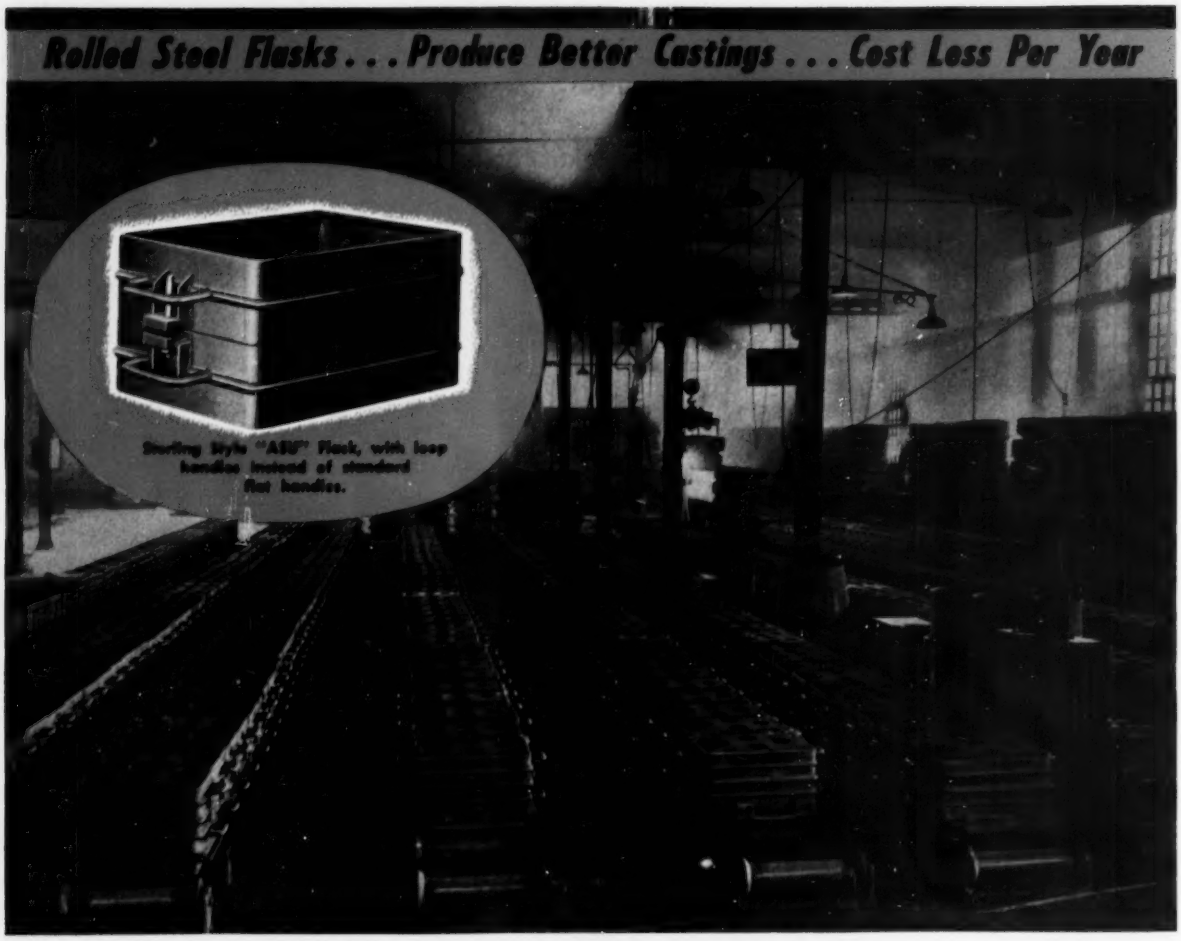
Rolled Steel Flasks . . . Produce Better Castings . . . Cost Less Per Year



A Leading Brake Shoe Manufacturer Specifies STERLING ROLLED STEEL FLASKS

The American Brake Shoe Company, operating plants in principal cities of the United States and Canada, discovered that it pays to replace cast iron flasks with Sterling Rolled Steel Flasks. At present, this internationally famous manufacturer has 30,560 sections rolling along the conveyor lines. Additional Sterlings are on order. Surely, these figures are significant. Sterlings were selected because they are engineered and built for a long service life. They provide a practical combination of maximum strength with minimum weight. Each rolled steel section, equipped with welded fittings, forms a solid rigid piece. The sand flanges at the top and bottom of each section have fillets so that sand will pack under flanges. A heavy reinforcing rib is rolled in the center of each section to resist tortional and other strains. All flanged surfaces are machined. These life-prolonging features enable foundrymen to produce better castings at a lower cost per casting. Get the facts. Write today for new Sterling Catalog just off the press.

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U.S.A.

Sterling

Pioneers in the Manufacture of Foundry Flasks

A 7442-1PC

Board Meeting

continued from page 69

S. C. Massari who left the Society on July 1. The Secretary reported that the membership goal of 11,000 had been surpassed during the year and that the Mid-South Chapter of Memphis, Tenn., and the Student Chapter at the University of Wisconsin had brought the total of AFS Chapters to 56. It was stated that 21 Chapters made their membership targets during the year, compared with 18 the year before.

During the year, seven Board Policy Committees met and developed policy recommendations which were approved by the Board in March 1953. Policies have been established for better guidance of the Board, the Chapters, the Committees and the Staff.

Total Income $507,426

The report of the Society auditors showed total Income of $507,426 during the year and total Expense of $563,099, or an excess Expense over Income of $56,573. During the year the Society's financial status was improved over the previous year by $57,198 and the General Reserve Fund was increased to $332,761. Accumulated cash is now invested through an investment service account at the Harris Trust and Savings Bank, Chicago, including U.S. Government Bonds, Canadian Government Bonds, industrial stocks and industrial bonds.

In the final report of S. C. Massari on technical activities he pointed out that AFS conducted seven separate research projects during 1952-53 and that the Cupola Research Committee has now been reactivated.

Two major publications listed for prompt action are revised editions of the Cast Metals Handbook and the Cupola Operations Handbook. A total of 10 new publications were completed and distributed during the year.

Board Committees' Report

In the reports of Board committees it was stated that all but eight Chapters had been contacted personally by Directors during the year. The Safety & Hygiene & Air Pollution Committee has been extremely active in developing important literature, particularly progressing an Air Pollution Control Manual and a Dust and Ventilation Control Manual.

In reporting on progress of the new AFS Headquarters Building, the Housing Committee stated that plans and specifications have now been com-

continued on page 98

NEW PORTABLE SCALES • NEW COUNTING SCALES • NEW FLOOR SCALES
NEW BUILT-IN SCALES • NEW HOPPER SCALES • NEW TRACK SCALES • NEW PRINTWEIGH SCALES
• NEW BENCH SCALES • NEW MOTOR TRUCK SCALES • NEW MILK RECEIVING SCALES • NEW OVER-UNDER SCALES
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HEADQUARTERS FOR SCALES
Proudly Introduces
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A great new line of Toledos! *44 new features* are now added to the traditional accuracy and dependability of Toledo Scales including—double pendulum mechanism in one-piece sector design . . . dial installed to face any of eight directions . . . new clean-line design with handsome gray finish. Complete range of types and capacities. Get your scale information up-to-date . . . write today for the new condensed catalog No. 2001. Toledo Scale Company, Toledo 1, Ohio.

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"FALLS BRAND" ALLOYS
AMERICA'S LARGEST PRODUCERS OF ALLOYS

"FALLS"
NO. 11 ALLOY
makes
High Electrical
Conductivity Copper Castings

The manufacturing of high electrical conductivity castings is no longer restricted to a highly specialized group of foundries.

It is now open to all foundries. There are no secret arts or formulae.

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— degasifies and deoxidizes the copper.

— protects the molten copper from reoxidation up to and during the pouring operation.

Insuring
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HIGH ELECTRICAL CONDUCTIVITY CASTINGS.

WRITE
FOR COMPLETE DETAILS

NIAGARA FALLS
Smelting & Refining Division
Continental Copper & Steel Industries, Inc.
BUFFALO 23, NEW YORK

Niagara Regionals

continued from page 73

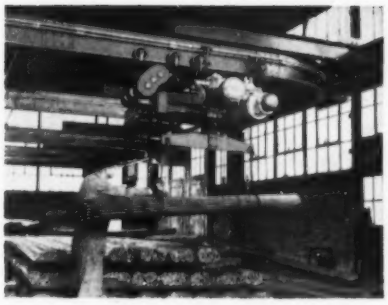
10 am—Noon: Shell Molding, "D" Process.
Speaker—F. S. Brewster, H. W. Dietert Co., Detroit
12:15 pm: Luncheon
Presiding—E. J. Burke, Hanna Furnace Corporation, Buffalo, N. Y.
Speaker—C. V. Nass, Beardsley & Piper Div., Pettibone Mulliken Corp., Chicago
"Mechanization of Molding" (Motion picture)
2:15-3:30 pm: Sectional Meetings
Gray Iron—Subject: To be announced.
Speaker—Vern Patterson, Climax Molybdenum Corp., Detroit
Non-Ferrous—*"High Tensile Bronzes"*
Speaker—William Young, Wm. Kennedy & Sons, Ltd., Owen Sound, Ont.
Steel—Subject: To be announced.
Speaker—To be announced.
Malleable—*"Malleable Foundry Practice"*
Speaker—F. B. Rote, Albion Malleable Iron Co., Albion, Mich.
3:45-5 pm: General Meeting—*"Foundry Sands"*
Speaker—C. A. Sanders, American Colloid Co., Chicago

A Warning

A woman-crazy paster took a crazy little core
To a whiskey-crazy molder on his crazy little floor.
The crazy molder took this core and set it,
I am told,
In a crazy little core print in a crazy little mold.
What the molder didn't know was that this
woman-crazy gent
Had pasted up that crazy core without a single vent.
The crazy heat gang poured it, and before that
gang was through
The crazy core she blew, boys, Lordy! How she blew!
The crazy office questioned the foundry-crazy boss
About this crazy casting and the reason for its loss.
And that woman-crazy paster—perhaps you've guessed before—
That woman-crazy paster doesn't work here any more.

From the book *Rammed Up and Poured,* by Bill Walkins, copyrighted by the Electric Steel Foundry Co.

MONORAIL *Pays!*

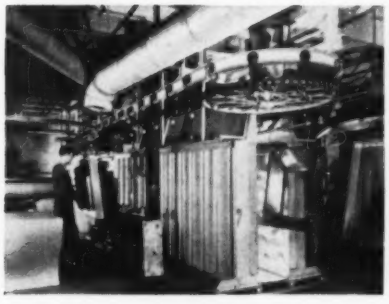


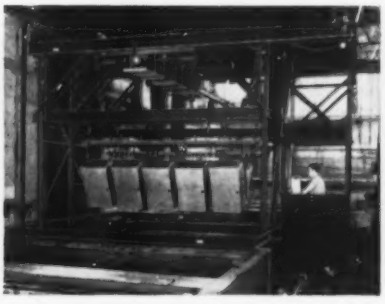
INCREASES TONNAGE

From 26 to 48 tons of steel rod per day was the increased movement produced by a properly engineered monorail system.

LOWERS COST

This simple system actually saved $150 in handling costs within four months of operation. No more sheet-by-sheet movement.





SAVES TIME

Passage, on monorail, of metal parts through infra-red dryer, cuts 70% from former drying time. All other handling in plant on monorail.

MORE CAPACITY

30% more capacity was added to metal cleaning process by handling a third more units on carrier with one man operation from cab control.

LESS LABOR

Operators claim to save 26 man hours per truck over former unloading time. Interlocking monorail cranes in the plant also reduce handling costs.

Write for Bulletin C-1
showing many more cases where MONORAIL PAYS!

THE AMERICAN MONORAIL COMPANY

13122 ATHENS AVENUE **CLEVELAND 7, OHIO**

Which "High Strength" Do You Want Most In An Aluminum Alloy?

High TENSILE Strength?
High IMPACT Strength?
High ELONGATION?
High BRINELL?

NO!

Most important is HIGH YIELD STRENGTH, for this is the measure of the *useful limit* of a material.

What do you care if a casting of such-and-such an alloy will not rupture until 40,000 psi?

What you want to know is how much the casting can take *before it fails in its job.* And that is told by its YIELD STRENGTH.

Castings made with Federated Tenzaloy will give you yield strengths of which the following are typical:

	As Cast	Aged 10-14 Days At Room Temp.
Sand Cast	16,000 psi	25,000 psi
Permanent Mold	14,000 psi	27,000 psi

And remember, no heat treatment is needed!

These and other outstanding properties have been proved stable for as much as four years.

Full particulars are given in Bulletin No. 103. Graphs, tables, illustrations included. For free copy of bulletin use coupon below.

Federated Metals Division
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In Canada: Federated Metals Canada, Ltd., Toronto and Montreal

Federated first in the non-ferrous field FMD

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COMPANY NAME _____
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CITY _____ ZONE _____ STATE _____

G.I.F.S. Meeting

continued from page 74

Speaker: Stuart Heinritz, editor, *Purchasing* magazine
Subject: (to be announced later)
Speaker: (to be announced later)
Subject: (merchandising, market development, etc.)
12:30 pm—Reception
1 pm—Industry luncheon
Introduction: New board of directors
Introduction: New society officers
Presentation of citations and awards
Presentation of prizes—1953 Redesign Contest
Speaker: Tom Collins, director of public relations, City National Bank, Kansas City, Mo.
Subject: (to be announced later)
Adjournment
2:45 pm—Meeting—New board of directors

N.F.A. Meeting

continued from page 74

hear the most outstanding men on both sides present arguments in support of their position. Basically, these arguments will be the same ones that will be used when the Taft-Hartley Act comes up for consideration again at the next session of Congress—and the same ones you will hear and use in your next bargaining sessions.

Administrative Council Will Meet

On September 16, the day prior to the open meeting, officers and members of the Administrative Council will meet to elect the officers of the association for the coming year. Present officers of the NFA are: *President:* Summerfield Brunk, president, Headford Brothers and Hitchins Foundry Co.; *Vice-President:* W. W. C. Ball, vice-president, Taylor and Fenn; *Treasurer:* Frank J. Sherwin, president, Chicago Hardware Company; *Executive Secretary:* Charles T. Sheehan.

The Annual Alumni Banquet will be held on the evening of September 16. At this dinner, which will be attended by past officers of the association, recognition will be accorded to the organization's living past presidents:

Thomas W. Pangborn—1933-36
Franklin R. Hoadley—1936-39
William D. Hamerstadt—1939-42
Herman Menck—1944-46
I. R. Wagner—1946-48
Franklin Farrel, 3rd—1948-49
Harry E. Ladwig—1949-50
A. V. Martens—1950-52

ATTENTION!

Producers of non-ferrous

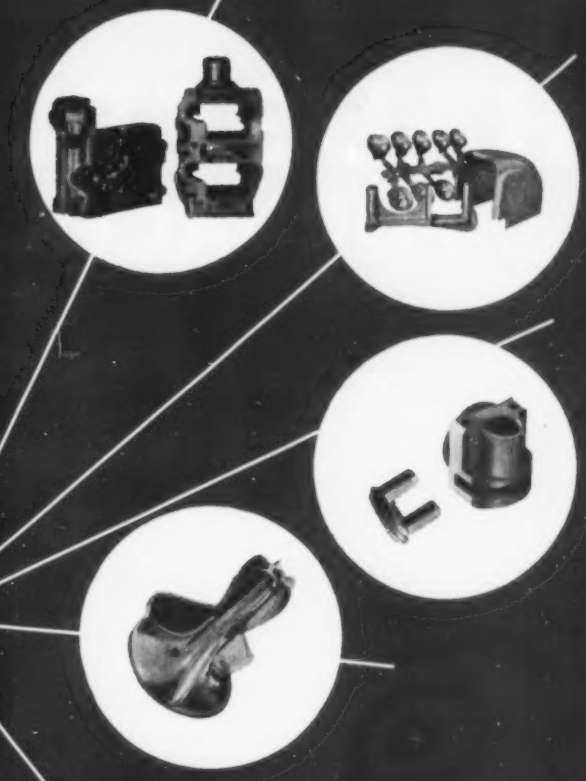
..die castings

..permanent mold casting

..sand castings

..centrifugal castings

For additional information ask for bulletin 560.



You'll get even better castings if you melt with a

LINDBERG-Fisher

2-CHAMBER MELTING FURNACE

You'll increase production. You'll reduce rejects. You'll improve working conditions. The famous Lindberg-Fisher 2-chamber construction does the trick.

Two-chamber construction gives you cleaner molten metal. Residue and impurities remain in the charging chamber . . . and only the clean, residue-free metal passes to the ladling chamber.

Two-chamber construction permits continuous ladling. Cold metal can be added to the charging chamber without affecting temperature of ladling chamber within operating limits of the furnace.

Two-chamber construction permits cooler operation. Induction heating heats only the metal, not the entire furnace. There are no flames—no products of combustion. Only a comparatively small area of molten metal is exposed to operator.

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FOR "ALL-OUT" PRODUCTION IN NON-FERROUS FOUNDRIES

Provide the Utmost in Speed Production and Safety

FURNACES FOR
BRASS • ALUMINUM • MAGNESIUM
AND ALL OTHER
NON-FERROUS ALLOYS

The Campbell-Hausfeld Co.

900-920 MOORE ST. HARRISON, OHIO

Board Meeting

continued from page 93

pleted for obtaining contractor bids. Total estimated cost of the new structure, which will be air conditioned, streamlined for efficient operation, and will contain over 10,000 sq ft of floor space, is now over $240,000. In authorizing this expenditure the Board agreed to finance the difference between total cost and contributed funds, now approximately $149,000. It is intended that additional subscriptions will be sought from the membership during 1953 in order to complete the project.

In organizing the new Board for 1953-54, Secretary-Treasurer Wm. W. Maloney was re-elected for the term of one year and the budgets of estimated Income and Expense approved as recommended by the Finance Committee. These budgets contemplate an excess Income of $70,000 by June 30, 1955, compared with actual excess Income of $126,040 in the two-year period 1951-1953 and $72,044 for the period 1949-1951. Separate budgets of Income and Expense for the Safety & Hygiene & Air Pollution Program were also approved.

Carter Announced Appointments

President Carter announced the appointment of various Board committees with the following Chairmen: *Chapter Contacts Committee,* Vice-President Dost, Chairman; *Annual Lecture Committee,* H. Bornstein, Chairman; *Publications Committee,* H. J. Rowe, Chairman; *Board Research Committee,* M. A. Fladoes, Chairman; *Editorial Advisory Committee,* A. L. Hunt, Chairman; *Technical Correlations Committee,* W. W. Levi, Chairman. President Carter and past President Wagner will represent AFS as official delegates to the International Foundry Congress in Paris. R. J. Teetor continues as Chairman of the AFS Housing Committee. AFS representatives to the National Castings Council will be President Carter and Vice-President Dost. The Board also appointed A. L. Hunt as its liaison to the Educational Division, and Directors E. C. Hoenicke and V. F. Stine as Board liaison to the Steering Committee of the S&H&AP Program.

The following Directors were elected members of the Executive Committee to serve with the President and Vice-President during 1953-54: Directors H. W. Dietert, A. L. Hunt, M. A. Fladoes, and I. R. Wagner. President Carter will act as Chairman of the Finance Committee which also in-

continued on page 100

IF BETTER MOLDS CAN BE MADE, YOU CAN MAKE THEM WITH

NATIONAL BENTONITE

WHY IT'S FIRST CHOICE WITH MANY GOOD FOUNDRYMEN:

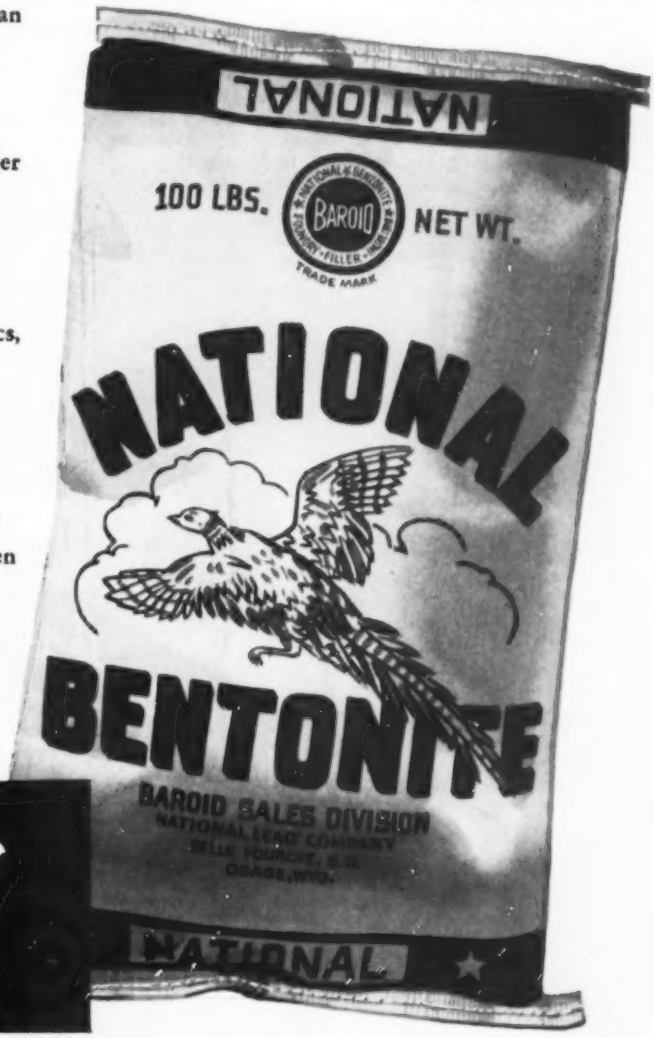
Consistently uniform high quality • Good green strength • High hot strength • High tensile strength • Yields high permeability • Provides high deformation • High sintering point • Requires least water to temper correctly • Good mold durability • Close laboratory control

Among good foundrymen, you'll find many an experienced man who prefers National Bentonite for bonding because he knows he can depend on the many properties it offers to provide a superior bond . . . which means, in terms of better production, better castings which require less time in the cleaning room.

Proper moisture control being one of the most important factors in good mold characteristics, it's always best to use a bonding material that requires the least amount of water to temper correctly. Foundrymen have found that they can control their moisture content correctly with proper proportions of National Bentonite in their molding sand. That's why so many good foundrymen say, "I can rely on National Bentonite."

FIRST CHOICE WITH MANY GOOD FOUNDRYMEN FOR YEARS

Quick Service From Better Foundry Suppliers Everywhere



Baroid

Baroid Sales Division ★ National Lead Company
Bentonite Sales Office: Railway Exchange Building, Chicago 4, Illinois

Annual AFS Board Meeting

continued from page 98

cludes Vice-President Dost and past President Wagner.

1954 Convention

Recommendations of the 1954 Committee of Exhibitors which met in Chicago July 14 were approved by the new Board, the exhibits to open on Saturday, May 8, and to close at 1 p.m. on Friday, May 14. May 8 will be designated "Northeastern Ohio Day" for employees of Cleveland area foundries. The annual Business Meeting of the Society will be held the morning of May 12, the Annual Banquet that same evening.

By-Laws Revisions

A major step in Society administration was the approval of completely revised By-Laws under which the Chapters will be divided into five Regions, each headed by a Regional Vice-President elected by the Board. The Regional plan is expected to reduce materially the burdens of time and travel imposed upon the Officers of the Society in recent years.

At the same time the By-Laws provide for increasing the number of Directors from the present 18 to a total of 24 with all of the Chapters organized into "Chapter Groups." It is intended that each Chapter group shall have constant and equitable representation on the Board at all times, insofar as possible. In order to accomplish this, it is proposed to revise the nomination and election procedure so that the Nominating Committee will nominate six Directors annually and the Board of Directors will appoint one Director annually. In this manner it is intended to gain adequate representation for the Chapters and Divisions and at the same time representation for the various industrial interests in the industry as well as non-Chapter areas.

As required by the By-Laws, the proposed revisions will be forwarded to members of the Society for letter ballot in the near future so that the revisions may become effective before the close of 1953. Certain other revisions have been recommended by the Society's attorneys and concern the desire to revise the AFS Charter, first drawn in 1916.

1954 Convention Fees

The Board approved recommendations of the Finance Committee that registration fees at the 1954 Convention and Exhibit be the same as in 1953, namely $2 per Member and $5 for non-members with provision for advance registration of employees of Company and Sustaining members at the Member fee. Recommendation was also approved that exhibit space rentals in 1954 be charged at the rate of $3 per sq ft the same as in 1952.

Publications

The Board approved an extensive budget for the preparation of new publications on foundry practice, as recommended by the Publications Committee. The list of books and pamphlets proposed will make the Society's offering even more inclusive than in the past.

Research

A two-year appropriation of $70,000 for AFS-sponsored research was approved on recommendation of the Finance Committee. At the same time the Society's obligation to broaden its fundamental research work was emphasized.

Education

The Secretary announced that the Society is still seeking a staff Educational Director for developing a more aggressive educational program at the secondary school level through the medium of the Chapters. The Board voted to become a contributing member of the Foundry Educational Foundation, in addition to being a Charter sponsor.

Resolution

At the opening session President Wagner announced the untimely death of Max Kuniansky on July 21 and a resolution was offered commemorating his service to AFS and to the industry, as a Wm. H. McFadden Gold Medalist in 1941, as President of the Society in 1947-48 and as a constant contributing member of AFS committees. By unanimous action of the Board, the resolution was ordered spread across the minutes of the meeting, with a copy to be sent to his family.

Nominating Committee

The Executive Committee, as required by the By-Laws, appointed the 1953-54 Nominating Committee in special session, the names of which will be published to the membership in the October issue of AMERICAN FOUNDRYMAN. The committee is expected to meet in December for nominating new Officers and Directors of the Society, in accordance with By-Laws approved in the interim by the membership.

A.S.T.M. Holds Meeting

THE 1953 annual meeting of the American Society for Testing Materials was held during the week of June 28 at Atlantic City, N. J., featuring 34 technical sessions and over 550 meetings of technical committees.

Seventy-two of the society's technical committees reported at the meeting, resulting in the approval of 63 new specifications, and the revision of 185 existing tentatives and standards. All of the new and revised standards will be published later in the year in the 1953 supplement to the book of A.S.T.M. Standards.

Board Reports

The A.S.T.M. board of directors, in its annual report to the meeting, noted the continually increasing responsibility placed on the society for authoritative information and for standards on materials.

Honorary membership was extended to two long-time members of the society, men of outstanding eminence in the field of engineering materials. This honor was bestowed upon Dr. Horace H. Lester, principal physicist, Watertown Arsenal, Watertown, Mass.; and, posthumously, upon Lloyd B. Jones, former engineer of tests, Pennsylvania Railroad, who died on June 7, 1953.

Merit Awards

Ten society members who have given outstanding service in technical committees received awards of merit. This is the fourth year that A.S.T.M. has made such awards. Those honored for 1953 are: E. G. Ham, technical director, John A. Manning Paper Co., Troy, N. Y.; J. T. MacKenzie, technical director, American Cast Iron Pipe Co., Birmingham, Ala.; D. G. Miller, materials engineer (retired), Bureau of Public Roads, U. S. Department of Commerce, University of Minnesota, St. Paul, Minn.; R. E. Peterson, manager, mechanics division, Westinghouse Research Labs, Westinghouse Electric Corp., East Pittsburgh, Pa.; C. H. Rose, manager, Washington (D.C.) office, National Lead Co.; W. A. Selvig, senior chemist, U. S. Bureau of Mines, Pittsburgh, Pa.; E. I. Shobert II, manager, research and engineering, carbon division, Stackpole Carbon Co., St. Mary's, Pa.; E. R. Stivers, director, Package Research Laboratory, Rockway, N. J.; Jerome Strauss, vice-president, Vanadium Corp. of America, New York; and R. B. Young, associate director of research, Hydro-Electric Power Commission, Ontario, Canada.

Of the 34 technical sessions, 16 comprised seven symposia on timely material subjects. The symposia covered metallic materials at low temperatures, fluorescent x-ray spectographic analysis, radioactivity in A.S.T.M. work, electron metallography, lateral pile load tests, porcelain enamels and ceramic coatings as engineering materials, and dynamic testing of soils. It is expected that the papers will be issued as special technical publications later in the year.

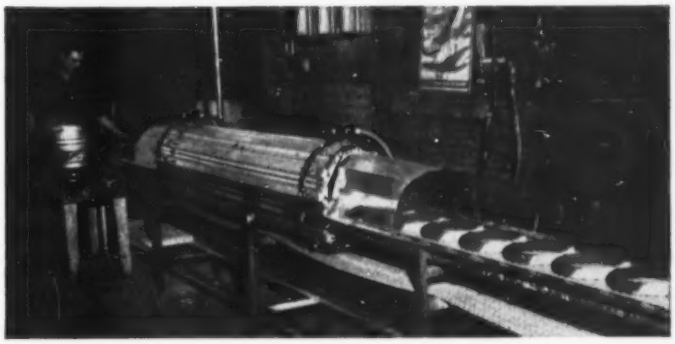
Two Lectures Presented

Two excellent lectures were presented at the meeting. Dr. Frederick D. Rossini, Silliman professor and head of the chemistry department, Carnegie Institute of Technology, spoke on "An Excursion in Petroleum Chemistry." "Micrometallurgy" was the topic of Jerome Strauss, vice-president, Vanadium Corp. of America.

New A.S.T.M. officers are: Leslie C. Beard, Jr., Socony-Vacuum Oil Co., Inc., New York, president; C. H. Fellows, Detroit Edison Co., vice-president.

Another CHROMALOX Production Tip

Core Drying Time Cut from 24 HOURS to 6 SECONDS!



PROBLEM

To speed up the drying of the dip-coat applied to cores for casting automotive parts. At least 24 hours drying time was needed under old method, and 6000 square feet of valuable floor area was used to store the cores while they air dried.

SOLUTION

The foundry installed a compact far-infrared core drying oven made of eleven 3.6 kilowatt all-metal Chromalox Electric Radiant Heaters. A 15-foot conveyor belt, variable in speed from zero to 10 feet-per-minute, moves cores through the oven at rate of 600 to 800 per hour. Cores are thoroughly dry in 6 seconds and ready for assembly.

ADVANTAGES

1—Drying time reduced from 24 hours to 6 seconds! 2—Existing core drying area including oven occupies only 200 square feet against 6000 square feet the old way. 3—Core surfaces are smooth and bubble-free with rejects practically eliminated.

CHROMALOX
Electric Heat for Modern Foundries

Want to know more about cutting costs with CHROMALOX heat?

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7609 Thomas Blvd., Pittsburgh 8, Pa.
Send me more details on Chromalox Electric Heat for

☐ Shell molding ☐ Core drying
☐ Skin drying of molds ☐ Comfort heating

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Company
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How can you

SAVE MONEY

IN CASTING

all types of

ALUMINUM ALLOYS?

answer:

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COVERAL

for these important reasons:

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2. Prevents oxidation.
3. Economical and easy to use.
4. Dissolves oxides.
5. Increases fluidity.
6. Creates no fumes.

FOSECO COVERALS are the most efficient covering compounds yet produced. Nearly a quarter century of "know how" and experience help you obtain BETTER aluminum castings at LOWER cost. You save metal—have fewer rejections.

There's a FOSECO COVERAL made for every type aluminum casting. Tell us the alloy you melt, type furnace and pouring temperature—we will be glad to recommend the proper FOSECO COVERAL for your requirements.

WRITE TODAY—ASK ABOUT OUR "NO RISK" TEST

FOUNDRY SERVICES, Inc.

280 Madison Ave., Dept. K

New York 16, N. Y.

Shop Talk

continued from page 72

Quench Cracks

We produce a number of cylindrical castings 11½ in. in diameter and 21 in. long with a small shoulder at one end. Typical composition is: TC, 3.20 per cent; Si, 1.50; Cr, 0.65; and Cu, 1.00. The castings are heated to 1600 F, held for 5¾ hr, quenched in oil at 140 F, then tempered at 375 F. Small cracks are developing in the casting at some point in the treatment.

Your trouble is probably quench cracking which results from the severe temperature gradients set up between the surface and the interior of such a large mass of metal. There are several possible solutions. One is to use a quenching oil that has a lower thermal capacity and will extract heat more slowly. A second is to quench for a controlled period, then withdraw to minimize the drastic quenching stresses that may develop during a thorough quenching. A third alternative is to quench out as completely as possible without cracking, then transfer immediately to the tempering furnace.

Strangled Risers

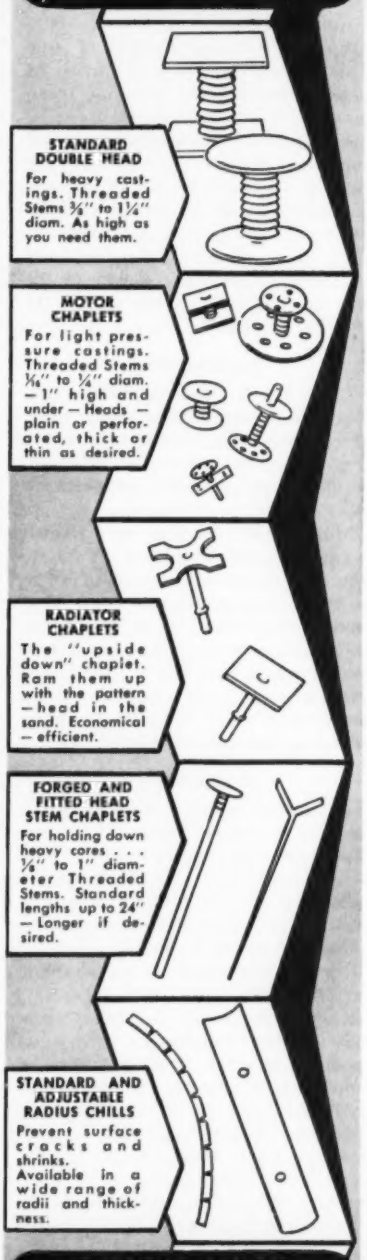
We are looking for information on strangled risers for steel castings.

You evidently have in mind necked-down or knock-off risers which are used not only for steel castings, but also for large gray iron and bronze casting. These risers are of normal size except where they join the casting. At this point the contact is considerably reduced by means of a thin core first used (and patented) by E. C. Washburn in 1908. The hole in the core that establishes the contact area and the core thickness are varied to suit the casting section and riser height.

The knock-off risers function by keeping the reduced neck fluid by means of heat supplied through the thin core from riser and casting. Ordinarily used in top risers, the Washburn core can also be used with side risers, but contacts should be slightly larger. Main advantage (there are no serious disadvantages) lies in the speed of riser removal and fast grinding possible.

Two good recent references are: *"Pros and Cons of Necked-Down Risers,"* J. B. Caine, AMERICAN FOUNDRYMAN, February, 1953, pp. 51-54, and *"KO Risers are OK,"* L. C. Hollien, AMERICAN FOUNDRYMAN, October 1951, pp. 30-32.

MILWAUKEE CHAPLET



STANDARD DOUBLE HEAD
For heavy castings. Threaded Stems ⅜" to 1¼" diam. As high as you need them.

MOTOR CHAPLETS
For light pressure castings. Threaded Stems ⅛" to ¼" diam. — 1" high and under — Heads — plain or perforated, thick or thin as desired.

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The "upside down" chaplet. Ram them up with the pattern — head in the sand. Economical — efficient.

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For holding down heavy cores . . . ⅛" to 1" diameter Threaded Stems. Standard lengths up to 24" — Longer if desired.

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Prevent surface cracks and shrinks. Available in a wide range of radii and thickness.

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Obituaries

Carl F. Erickson, 69, founder-owner of the Arrow Pattern and Foundry Co., Chicago, died recently. He was president of the Swedish Cultural Society of America and had been made a knight of Vase by the late King Gustav for activities in the American Swedish community.

William J. Keefe, Sr., AFS member, died recently. He was a salesman for Wm. E. Pratt Mfg. Co., Joliet, Ill.

A Simplified Foundry Air Pollution Survey

I. Make a drawing or sketch of foundry roof plan and surrounding areas as follows:

1. Locate and identify all exhaust stacks including core oven stacks.
2. Locate foundry cupolas, open hearth, or air furnace stacks.
3. Locate and identify all roof ventilators.
4. Show all roof monitor window locations including direction windows face.
5. Show fresh air intakes to air heaters and cooling air systems.

II. Make air pollution survey as follows:

1. Leave your hat in the office!
2. Take a bare head, clear nose, and good eyes up to foundry roof.
3. Make notations on the drawing of all stack or window discharges. Describe color, odor, estimated density, distance discharge can be seen or traced, whether discharge is smoke, solid particles, steam, water droplets, or mud.
4. Note all deposits on roof with description of deposit including quantity and probable source.
5. Repeat survey for each period during day when a significant change in operations takes place, for example cupola light up time, mold pour-off time, and normal molding operations.
6. Record wind direction at time of survey.
7. Note whether stack discharges are carried into building air intakes.
8. Observe and describe all material deposits on grounds and on other buildings surrounding foundry.

III. Decide if any stack discharges create a nuisance.

IV. Take steps to reduce or eliminate those nuisances if they exist.

SEMET-SOLVAY FOUNDRY COKE

CONTROLLED—SEMET-SOLVAY'S coke plants are equipped for quality production. Guesswork is eliminated, resulting in constant uniformity in the finished product. That is why, day in and day out, our foundry coke comes up to specifications — the specifications you have demanded.

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CHILL KOOLHEAD NAILS

Chill Nails and Spiders

for... ACCURATELY CONTROLLED FOUNDRY CHILLING

Write for samples and prices

Choose any style from Jumbo to Stubby; slim, medium or horse nail blade; blunt, pointed, straight or 90° bent. There's a type and size Koolhead Chill Nail or Spider Chill to do your specific chill job best.

You can rely on "KOOLHEAD" and "STANHO" products

STEEL Stanho PRODUCTS

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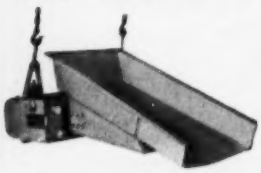
STANDARD HORSE NAIL CORP
Since 1872 NEW BRIGHTON PA

Feeding tempered foundry sand to a pneumatic mold.

VIBRATORY FEEDERS

SYNTRON

Simplify Your Sand Handling



Syntron Feeders not only simplify and speed up sand handling, they are economical to operate. Their electro-magnetic drive eliminates gears, cams or belts that require expensive replacement. Finger-tip controlled feeding from pounds to hundreds of tons per hour. Provide efficient handling of most materials from heavy lumps to pulverized substances—wet or dry—hot or cold.

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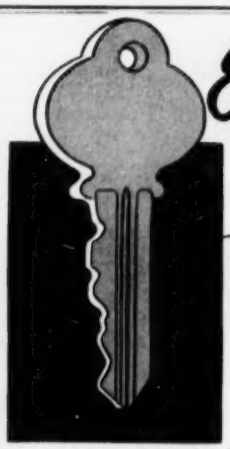

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Payroll records may confirm your judgment that earnings are out of line . . . that some employees are receiving excessive pay while others are getting too little but they can't provide the facts you'll need to correct the problem.

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To many . . . this service has proven a valuable key in settling wage disputes because it provides specific facts which management and labor need to make a mutually fair and satisfactory adjustment.

Westover Engineers have solved scores of Foundry Management problems . . . cost . . . pricing . . . production . . . labor relations and plant management in all types of foundries. Why not use our know-how to improve your plant efficiency?

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Seek New Students For N. Y. Foundry Course

A FREE, practical course in the techniques and practice of foundry operations is being announced by the New York City board of education for its Machine and Metal Evening Trade School.

Although the course has been offered in the past, enrollment has lagged far below the school board requirements. In order to revive interest in the course, which is offered without charge, Metropolitan Brass Founders' Association has secured the consent of the New York board of education to reschedule the foundry course for the coming fall semester. Another step calculated to increase enrollment is the installation of a small metal melting furnace for use of the evening students, who will now be able to pour molten metal into the sand molds which they will make.

The course is designed and recommended for all persons requiring a good practical knowledge of the techniques of sand casting, including foundry employees, pattern makers, machinists, mechanical and metallurgical engineers, draftsmen, machine designers, casting buyers, inspectors, and salesmen working in the foundry industry.

The Scope

The curriculum of the course will include green sand molding with various types of patterns, both on the bench and on the floor; coremaking; melting, pouring and handling of metal; and the filing and cleaning of castings.

The course has received the full approval of American Foundrymen's Society, Metropolitan Brass Founders' Association, International Molders Union, and the Veterans Administration.

Although the city has a population of over eight millions, this is the only evening foundry class offered in New York. All foundrymen in the area are urged to assist in recruiting new registrants for the course.

All persons interested in enrolling should contact John Mangione, principal, Machine and Metal Evening Trade School, 321 E. 96th St., telephone, ENright 9-0700.

Registration for the fall term is scheduled for September 14 and 15, from 7-9 pm. Classes will be held on Mondays and Wednesdays, also from 7-9 pm. The short unit course will consist of 25 nights or 50 hours, while the full course comprises 50 nights or 100 hours. Satisfactory performance requires 80 per cent minimum attendance.

Chapter Meetings

September

11 . . Wisconsin
Hotel Schroeder, Milwaukee, Sectional Meeting.

25-26 . . Eastern Canada
Admiral Beatty Hotel, St. John, N. B. Canada, Maritimes Meeting.

28 . . Northwestern Pennsylvania
Moose Club, Erie, Pa. G. A. Pealer, General Electric Co., Elmira, N. Y. *"Pattern Engineering and Co-ordination to Produce Better Castings."*

October

1 . . Canton District
Mergus Restaurant, Canton, Ohio. C. V. Nass, Beardsley & Piper, Div. Pettibone Mulliken Corp., Chicago. *"Mechanization in Molding."*

Alloy Casting Institute Holds 13th Meeting

TITANIUM casting techniques and shell molding processes received special emphasis at the recent 13th annual meeting of the Alloy Casting Institute held at Hot Springs, Va. A variety of other special research subjects received attention during the technical sessions.

Although the Institute's members generally produce high alloy or stainless steel as their principal castings, titanium experimental production was discussed by J. H. Jackson. Battelle Memorial Institute, Columbus, Ohio. Dr. M. G. Fontana, Ohio State University, Columbus, Ohio, spoke on the economic and strategic aspects of titanium castings in particular. Shell molding was the topic of H. J. Cooper, Cooper Alloy Foundry Co., Hillside, N. J.

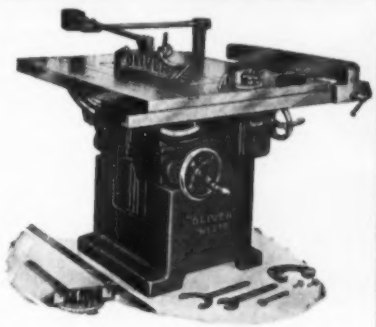
In addition, reports on the Institute's current metallurgical and foundry research in high temperature and corrosion fields were made by N. A. Matthews, American Brake Shoe Co., and W. T. Bryan, Duriron Co.

Election of Officers

New Officers of the Institute were elected at the meeting. G. A. Baker, Duriron Co., Dayton, Ohio, was named president. He served as vice-president of A.C.I. last year and succeeds H. T. Harrison, Duralloy Co., Scottdale, Pa. New A.C.I. vice-president is C. K. Lockwood, Stainless Steel and Alloys Division, Shewinigan Chemicals, Ltd., Montreal, Canada. E. A. Schoefer, Mineola, N. Y., was reelected as executive vice-president and treasurer.

Two new members were named to the Institute's board of directors. They are: K. E. Fitz, Babcock and Wilcox Co., Barberton, Ohio; and Thomas Rutherford, Midvale Co., Nicetown, Philadelphia, Pa.

"OLIVER"
No. 270D Tilting Arbor
SAW BENCH



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- Quickly and easily adjusted
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This is just one of ten "Oliver" Saw Benches. Write for Bulletin No. 270D.

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Low speed polishing is increasingly popular for the final step, particularly where soft non-ferrous metals are encountered. The production of smooth polished samples with a minimum of surface scratches and disturbed metal is the outstanding feature of this low speed Buehler Polisher No. 1505-2. Built to operate at selective speeds of 150 r.p.m. and 250 r.p.m. through a positive gear head drive housed in an oiltight base, this polisher represents the highest development in equipment for precision finishing of specimens. This polisher is also perfectly suited to the wax lap or lead lap polishing technique preferred by many metallurgists.

The 8" diameter polishing disc is attached to a countershaft by a tapered sleeve. This tapered fit and long span between bearings assures smooth operation. The motor is ¼ h.p. single phase ball bearing, operating on 110 V., 60 Cycle AC current. Shipping weight, 80 lbs.

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MAN WITH TECHNICAL EDUCATION and sixteen years experience in general foundry practice desires association as sales representative or process controls field man. Thoroughly qualified by extensive experience in sand practice, gray iron and steel, coatings for coves and molds. Thoroughly qualified in cupola melting practice and metallurgical control gray iron. Employed now. Available October 1. Satisfactory references. **Box A26, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

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PERMANENT MOLD SUPERINTENDENT—Excellent opportunity with large, modern Midwestern foundry having up-to-date equipment. Your experience should consist of permanent mold design or the operation of aluminum jobbing production. No other metal cast. Die design and gating knowledge essential. Promotional opportunities not limited. Attractive starting salary. Write stating age, experience, references and salary desired. **Box A29, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

OPEN HEARTH MELTER experienced in basic steel foundry practice. In replying give complete information which will be held in strict confidence by a single executive. Address: **Box A32, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

CHIEF INSPECTOR—Take full responsibility of our Inspection Department in big aluminum sand casting foundry. To qualify, you must know techniques of x-ray, zyglow, layout and be able to maintain quality control on aluminum aircraft castings. Excellent opportunity merits consideration of only top-flight man. Many company benefits. Write giving age, experience, references, salary desired. Confidential. **Box A27, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

STEEL FOUNDRY SUPERINTENDENT—Opportunity for the right man in a well-established midwest steel foundry producing 500-600 tons per month. Must be under 45 years old and must have had experience in electric furnace melting, cope and drag machine molding, gating and rigging. Applicant should have knowledge of cleaning, finishing and heat treat. Must be qualified to take over entire operation after six months on job. Must have good past record in labor relations. Good starting salary plus bonus. **Box A23, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

FOUNDRY ENGINEERS

and

FOUNDRY LAYOUT MEN

for designing, estimating, layout and detailing of equipment for mechanized foundries. Engineering company located in Detroit. Send complete resume to **Box A24, AMERICAN FOUNDRYMAN,** 616 S. Michigan Ave., Chicago 5, Ill.

PATTERN SHOP FOREMAN experienced in steel foundry practice desirable but not essential. In replying give complete information which will be held in strict confidence by a single executive. Address: **Box A33, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

FOUNDRY METALLURGIST required with experience in cast iron foundry practice. Prepared to travel. State age, experience and salary required. **Box A30, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

SUPERINTENDENT ALUMINUM FOUNDRY—Position calls for experience in sand casting aluminum jobbing work. Superintendent must know pattern and core box equipment. Brass and bronze jobbing experience also would be helpful. Knowledge of mechanical and jobbing procedures in a non-ferrous foundry preferred. This is an excellent opportunity in one of the nation's largest multiple-plant foundries, located in the Middlewest. Write giving age, experience, references, education and salary desired. Replies confidential. **Box A28, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

CORE ROOM FOREMAN experienced in steel foundry practice. In replying give complete information which will be held in strict confidence by a single executive. Address: **Box A34, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

WANTED A FOUNDRY TECHNOLOGIST, preferably with some experience in cast iron. Should be prepared to travel. State salary required and full qualifications. **Box A31, AMERICAN FOUNDRYMAN, 616 S. Michigan Ave., Chicago 5, Ill.**

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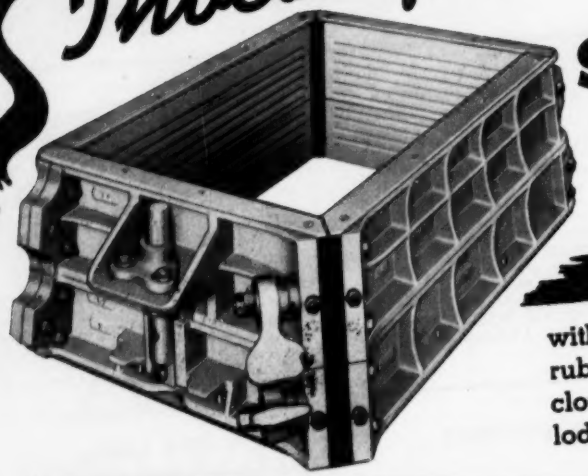

with the long-life, easily replaceable, live-rubber corner inserts which completely close the corner gaps so that no sand can lodge in the open corners.

PERFECT ALIGNMENT Indefinitely!

is guaranteed by the one-inch GROOV-LOCK FOOLPROOF PIN on

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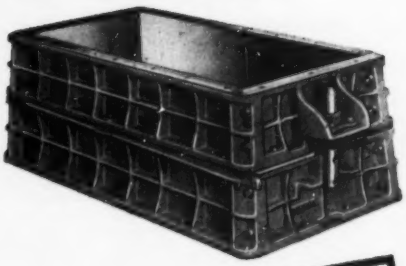
They are particularly adapted to cope or drag pattern jobs. Other types of standard pin fittings are also available. Solid, bolted and welded corner construction is a feature of Fremont Standard Slip Flasks.



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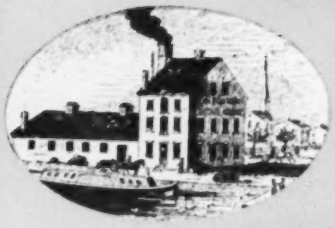
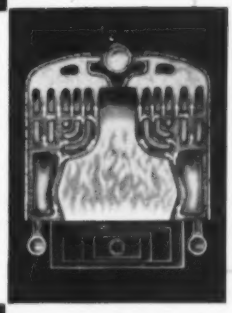
boiler cores shake out like sugar...

with LINOIL



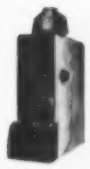
THE H. B. SMITH CO., INC., WESTFIELD, MASS., A CENTURY OLD THIS YEAR, HAS USED LINOIL EXCLUSIVELY SINCE 1929.

Boiler section castings are hoisted into free-swinging position where pneumatic vibrators loosen remaining core sand. Complete collapsibility of cores is essential for interior cleaning of sections.



Sectional view of Smith Boiler shows need for perfect cleaning inside boiler sections to give unobstructed circulation of water.

Heavy-duty twin sectional cast-iron header type boiler for industrial, commercial, and institutional applications.



Smith "Century" Special Gas Boiler for homes and small buildings.

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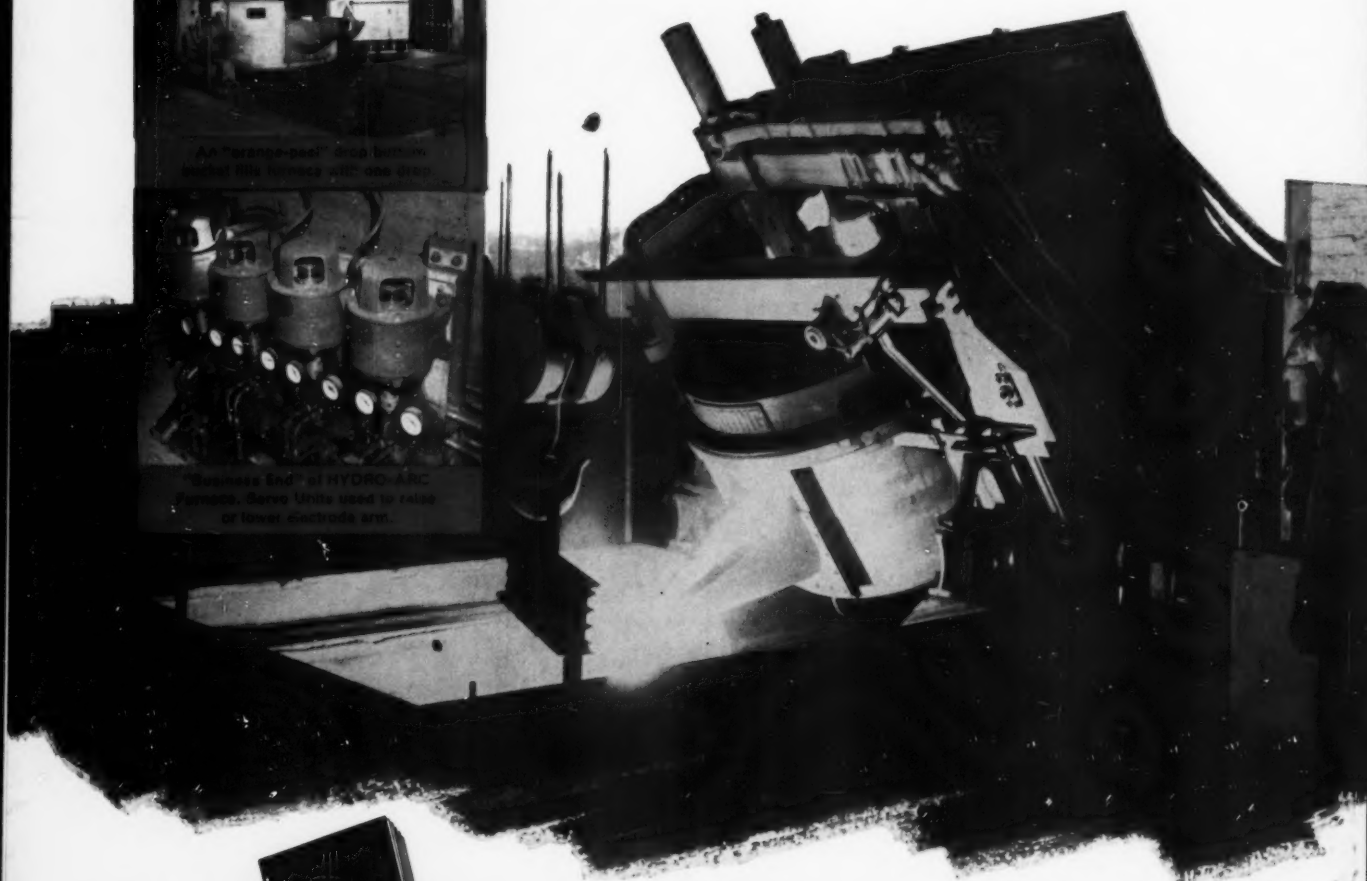
- **The Unique Hydro-Arc Top Charge,** a load factor improvement, reduces furnace down-time for recharging to only a few minutes. Because of its sound, basic simplicity, limit switches are eliminated and maintenance is held to a minimum.
- **The Hydro-Arc Air-Counterbalanced Hydraulic Electrode Positioning Equipment** assures less electrical energy and electrode consumption as well as improved metallurgical control and longer refractory life.



Write today . . . for 40 page bulletin FY-168. It completely describes Whiting Hydro-Arc Electric Arc Furnaces!

WHITING CORPORATION

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